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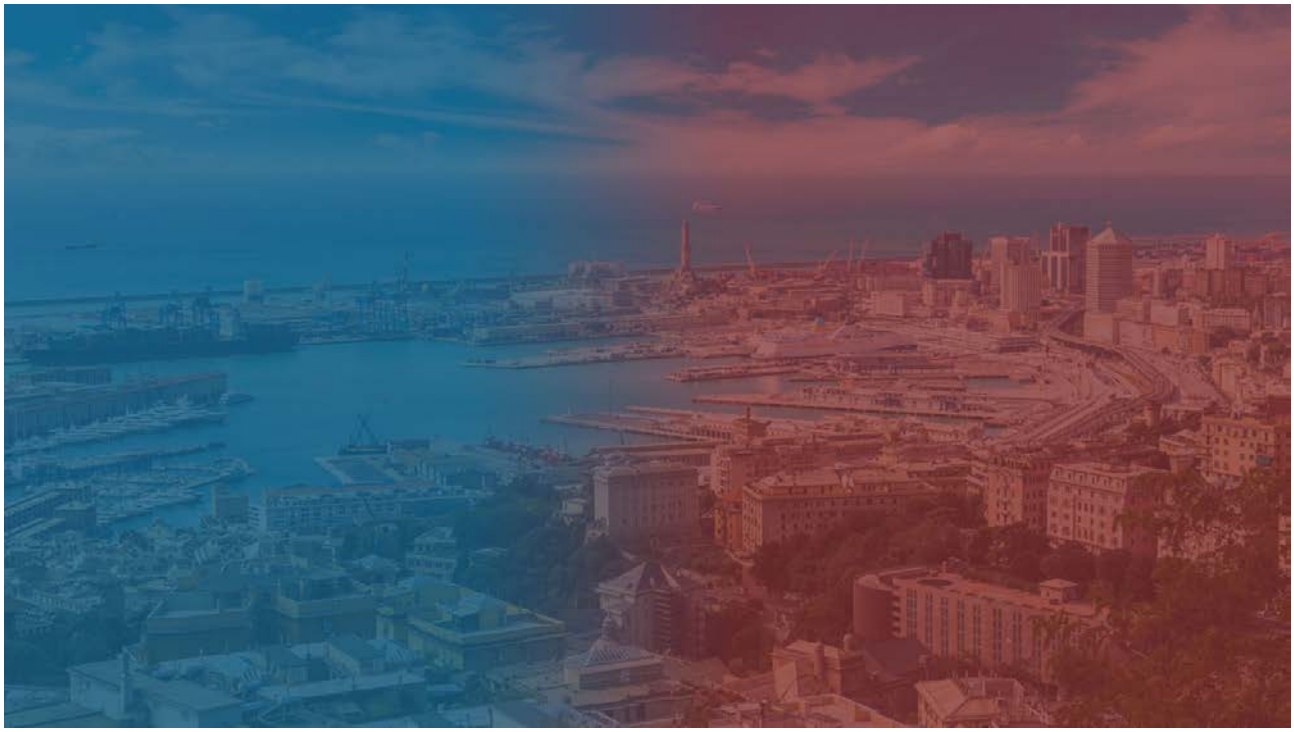

Tertiarization & sustainability new challenges for management in the digital era

Conference Proceedings

Short Papers

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12-13 June 2025

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Tertiarization & sustainability. New challenges for management in the digital era

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edited by

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To the reader,

this volume contains the short papers of the Sinergie-SIMA 2025 Management Conference, hosted by the University of Genova on June 12th and 13th 2025.

Tertiarization is one of the most salient profiles of the structural change and economic development that have characterized the recent decades (Jorgenson & Timmer, 2011). The growth of the service industry affects multiple sectors, e.g. wholesaling/retailing, tourism/hospitality, transport and logistics, health services, public administration, education, communication, banking and financial services, and B2B services (Baines *et al.*, 2017; Barrett *et al.*, 2015).
This growing relevance of services in the economy and the society has stimulated a broader interdisciplinary debate, e.g., the impact of tertiarization on the performance of the entire economic system, the innovation and digitalization of services, and the applicability of service management issues for the transformation of product-based business models.
Based on these premises, the 2025 Sinergie-SIMA Conference aims to explore the role of services as part of the evolution of society in terms of relevance, growth, competitiveness, innovation, but also sustainability and well-being. The lens of analysis used to explore this phenomenon will be digitalization, as it is shaping service innovation in more traditional sectors (e.g., social and sanitary services, tourism, retailing, etc.) and it is boosting knowledge-intensive business services (KIBS). Thus, digitalization is a key driver of the business model transformation, facilitating the transition of manufacturing firms towards digital servitization, enabling a new automation frontier (Frank *et al.*, 2019; Kastalli & Van Looy, 2013; Liu *et al.*, 2024), and paving the way for new opportunities for value creation within the global economy (Ostrom *et al.*, 2015).
The application of digital technologies to services (e.g., Artificial Intelligence, Big Data Analytics, Internet of Things, Machine Learning, Additive Manufacturing, Virtual Reality, Augmented Reality, Metaverse) also facilitates the pursuit of relevant environmental and social issues, for example contributing significantly to the achievement of greater systemic efficiency that help attain the Sustainable Development Goals (SDGs) and circular economy (Xing & Liu, 2023). Leveraging advanced technologies enables the extraction of valuable insights from vast amounts of information, facilitating informed decision-making, personalized service offerings, optimizing service delivery processes, and enhanced customer experiences (Chauhan *et al.*, 2022). Big data plays a strategic role in developing novel solutions that address evolving societal challenges, while driving sustainable growth and innovativeness in the digital era (Cappa *et al.*, 2022; Ciampi *et al.*, 2021; Mikalef *et al.*, 2019). Therefore, the real challenge today is to harness the application of digitalization to enhance the service-oriented approach and empower companies' economic, social, and environmental performances, generating and consolidating greater trust and loyalty among their employees, customers, and suppliers for a more sustainable, inclusive, and better society (Shaukat *et al.*, 2016).
AIDEA devoted a Conference to the tertiarization and new challenges for management and governance 25 years ago in Genoa, and many scholars focused on these topics from multiple perspectives and with original approaches.
The 2025 Sinergie-SIMA Genoa Conference, in continuity with the past, is an excellent opportunity to discuss our community's research efforts in the service economy and management, in order to identify new effective solutions suitable to face the current digital era. Different theories, methodological approaches, and units of analysis are required to generate scientific research impacting theories but also outlining wide-ranging strategies that can offer valuable insights to business leaders, companies, and institutions. More precisely, the Conference was a great occasion to discuss the research efforts of our research community within tracks related to the:

- Conference theme (Tertiarization & sustainability. New challenges for management in the digital era),
- SIMA thematic groups (Artificial intelligence in management, Entrepreneurship, Innovation & Technology Management, International Business, Marketing, Purpose-driven Businesses,

Retailing & Service Management, Small & Family Business, Strategic Communication, Strategy & Governance, Supply Chain Management, Logistics & Operations, Sustainability, and Tourism & Culture Management),
- Management Case Studies.

The Conference call for papers gave the opportunity to submit either short and long papers. Overall, the editorial staff received 311 submissions of which 263 short papers and 49 long papers.

For the *short and long papers*, the evaluation followed the peer review process, with a double-blind review performed by, respectively, one and two referees - university lecturers and experts about the topic - selected among SIMA and the community of Sinergie members.

In detail, the referees applied the following criteria to evaluate the submissions:
- clarity of the research aims,
- accuracy of the methodological approach,
- contribution in terms of originality/innovativeness,
- theoretical and practical contribution,
- clarity of communication,
- significance of the bibliographical basis.

The *peer review* process resulted in full acceptance or rejection of the submissions. In the case of disagreement among reviewers' evaluations, the decision was taken by the Chairs of the SIMA thematic groups or conference track. Each work was then sent back to the Authors together with the referees' reports. The suggestions received by the referees were used by the Authors during the presentation of their research works at the Conference.

The evaluation process ended with the acceptance of 293 papers (249 short papers and 44 long papers). This volume proposes the short papers whose Authors have authorized their publication.

All the short papers published in this volume were presented and discussed during the Conference and published online on the web portal of Sinergie-SIMA Management Conference (**https://www.sijmsima.it/**).

While thanking all the Authors, Chairs, and participants, we hope that this volume will contribute to advancing knowledge about tertiarization and sustainability in management.

The Conference Chairs

Lara Penco, Arabella Mocciaro Li Destri, and Marta Ugolini

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Track 1 –
Artificial Intelligence in Management

AI adoption in the workplace: Cognitive and Emotional Appraisals

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Abstract

The introduction of Artificial Intelligence (AI) technologies in the workplace is reshaping organizational dynamics and employee experiences. This study explores the role of primary and secondary appraisals in shaping employees' reactions to AI adoption, specifically focusing on the introduction of AI tools in a large organization. Data from a survey of 507 employees were analyzed using multiple linear regression and descriptive statistics, revealing significant relationships between dimensions of personal well-being, including positive emotions and economic security in the PERMA+ model, and employees' overall secondary evaluations, which include assessment of available resources, emerging through workplace wellbeing, life wellbeing, psychological wellbeing, and resulting emotions as reactions. The findings revealed that dimensions of the PERMA+ had a significant impact on employees' life and workplace wellbeing. The analysis showed that employees who perceived the AI adoption positively, particularly in terms of emotional engagement and financial stability, reported higher levels of wellbeing. Additionally, emotions like Happiness, Anger, and Sadness significantly influenced both life and psychological wellbeing, highlighting the importance of emotional regulation in shaping coping strategies and employees' overall adaptation to AI integration. The results underscore the importance of both cognitive evaluations and emotional responses in shaping employees' ability to cope with AI. These findings provide valuable insights for managers, highlighting the need to address employees' emotional needs and wellbeing during AI transitions to facilitate smoother adoption and promote long-term organizational success.

Framing of the research. *The integration of Artificial Intelligence (AI) into workplaces is accelerating globally, significantly impacting organizational dynamics and employee experiences (Zhang, 2024). In Italy, AI adoption has experienced remarkable growth, with the percentage of enterprises with at least ten employees using AI technologies increasing from 5.0% to 8.2% within a year, although it remains below the EU27 average (ISTAT, 2025). Numerous studies have highlighted the significant advantages AI offers to businesses, including enhanced operational efficiency and cost reduction (Wamba-Taguimdje et al., 2020; Tariq et al., 2021; Huang & Rust, 2020). The growing presence of AI in corporate management is reshaping decision-making processes, leadership approaches, and human resource strategies. AI-driven analytics enable organizations to optimize workforce planning, automate routine tasks, and enhance predictive decision-making, leading to more data-driven and strategic management practices (Leyer & Schneider, 2021; Trunk et al., 2020). However, while AI adoption provides efficiency gains, it also introduces new challenges for employees, including concerns over job displacement, shifting skill requirements, and increased performance monitoring (Malik et al., 2021; Koo et al., 2020; Braganza et al., 2020; Kong et al., 2021). These transformations require employees to adapt continuously, influencing their levels of workplace stress, motivation, and overall job satisfaction (Cheng et al., 2022; Kong et al., 2021).*

In response to the challenges arising from the introduction of AI in the workplace, employees adopt various coping strategies to manage the psychological and emotional impact. Workplace stress has been associated with increased turnover and decreased productivity (Bridger et al., 2013), which can negatively affect management. The severity and specific outcomes of the stress process largely depend on how individuals cope with potentially threatening events, such as the pressures arising from AI adoption. These events are also known as "stressors" (Carver et al., 1989; Aspinwall & Taylor, 1997; Skinner et al., 2003; Inzlicht & Kang, 2010). Coping, in this context, refers to the dynamic process of adjusting one's thoughts and behaviors to handle specific internal or external pressures that are perceived as challenging or surpassing an individual's available resources (Lazarus & Folkman, 1984). It helps to explain how stressors affect individuals, as well as when and why some people experience more or less detrimental consequences in terms of health and well-being (Skinner et al., 2003). It is important to highlight that there is both theoretical and empirical evidence that some types of coping strategies are more effective than others in mitigating the effects of stressors (Skinner et al., 2003; Britt et al., 2016).

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Based on the Cognitive Appraisal Theory (CAT), this study examines the three phases of the appraisal process: (1) primary appraisal, employees evaluate whether the adoption of AI is relevant and whether it represents a challenge or threat; (2) emotional response, employees experience emotions based on their goals, values and evaluate the situation; (3) coping strategies, in which employees develop mechanisms to manage their emotions and adapt to technological change. However, there is a significant gap in the existing literature, as much of the research focuses mainly on stressors and coping responses (Caraver, 1997; McWilliams et al., 2003; Zhao et al., 2022), marginally neglecting specific factors related to primary and secondary appraisals (Lazarus & Folkman, 1984).

A crucial aspect of primary appraisal involves evaluating the goal relevance and goal congruence of AI adoption (Kornes et al., 2019). Goal relevance appraisal refers to the degree to which a given situation influences an individual's current goals, broadly encompassing personal concerns, values, and needs (Sander et al., 2019). In contrast, goal congruence appraisal evaluates whether the situation supports or hinders these goals (Moors et al., 2013; Sander et al., 2005). When a situation facilitates goal achievement it is perceived as goal-congruent. Conversely, if it obstructs goal attainment, it is considered goal-incongruent (Kornes et al., 2019). Beyond primary appraisal, employees also engage in secondary appraisal, where they evaluate their available resources to cope with AI-related changes (Lazarus & Folkman, 1984). The interaction between these two appraisal phases is crucial for understanding individual differences in how employees react to AI and the effectiveness of their coping strategies. Ultimately, the introduction of AI does not merely alter work tasks and organizational efficiency but also redefines employees' perceptions of their roles, professional security, and long-term career trajectories (Malik et al., 2021). Understanding how individuals cognitively and emotionally respond to AI integration is essential to assessing its broader implications for employee well-being. As AI adoption progresses, organizations must consider not only its functional benefits but also the psychological impact on employees, fostering a work environment that supports positive adaptation and long-term engagement.

Purpose of the paper. *This study aims to investigate how employees perceive and react to the introduction of AI in the workplace, analyzing their behavioral and emotional responses in relation to workplace well-being. While existing studies have primarily examined stressors and coping strategies, limited attention has been given to the secondary appraisal process through which employees interpret AI-related changes and determine their ability to manage them effectively (Lazarus & Folkman, 1984). Guided by the framework of positive organizational behaviour (Luthans, 2002), this study seeks to understand how employees' subjective evaluations of AI implementation shape their emotional reactions, and overall well-being. The research will address the following key question:*

RQ: How do employees' cognitive appraisals and emotional responses influence their adaptation to AI integration in the workplace?

By investigating the cognitive and emotional appraisal process, this study aims to provide a more nuanced understanding of employees' psychological responses to AI-driven transformations. The findings will contribute to both theory and managerial practice by offering insights into how organizations can effectively support employees in navigating AI transitions, fostering adaptability, well-being, and performance in the workplace.

Methodology. *This study employs a survey-based research design to investigate employees' perceptions, behaviors, and emotional responses to AI integration in the workplace. The survey was conducted within a large organization in the Telecommunication services that recently implemented the AI tool Copilot, allowing for an in-depth analysis of how employees across different roles and expertise levels experience this technological transition. The current sample includes 507 employees, providing a broad and diverse sample that captures variations in competencies, professional backgrounds, and exposure to AI-driven processes. However, data collection is still ongoing, and the results presented in this study represent an initial phase of the analysis. At present, approximately 60% of the target sample has been collected.*

Primary appraisals were assessed using the PERMA+ model (Donaldson et al., 2022), which explores employee well-being through dimensions such as engagement, meaning, accomplishment, and physical health. These emotions reflect the overall perception of AI in the workplace context, without delving into the specifics of how employees assess their personal resources to cope with technological changes. In contrast, emotional responses related to the evaluation of available resources in the secondary appraisal phase were measured using the Emotion Scale (Schmidt et al., 2010). This scale captures a broad spectrum of affective reactions to workplace experiences, such as frustration, anger, fear, anxiety, as well as hope, challenge, and other emotions tied to personal resource assessment in response to AI adoption. This distinction between primary and secondary appraisals helps mitigate methodological overlap, treating workplace wellbeing separately from the emotional responses related to coping resources in the face of technological change.

Therefore, coping resources were measured with the Employee Wellbeing Scale (Zheng et al., 2015), designed to capture employees' perceptions of their available resources in different areas: Phsycological, Life and Work wellbeing. The evaluation of available resources in this scale is measured through several dimensions including responsibilities, satisfaction, self-esteem, and time management. The collected survey data have been analyzed using SPSS, applying multiple linear regression analyses and descriptive statistics to examine the relationships between employees' appraisals of AI, their emotional responses, and employee wellbeing.

Results. *The overall model was found to be highly significant ($p < 0.001$), suggesting that the dimensions of the PERMA+ model have a significant impact on employees' Life Wellbeing. Dimensions from PERMA+, such as Positive Emotions, Engagement, Relationships, Accomplishment, Physical Health, and Economic Security emerged as significant factors with the greatest impact, indicating that employees' life satisfaction is closely linked to their wellbeing and success, both in emotional dimensions and work practices. Among these, Positive Emotions and Economic Security were found to be particularly decisive, highlighting that emotional wellbeing and financial security are crucial for a fulfilling life. Regarding wellbeing in the workplace, the regression analysis revealed that Positive Emotions had a particularly strong effect, followed by Work Meaning and Mindset, demonstrating that employees who perceive greater emotional engagement and have a strong mindset in their work, particularly following the introduction of Copilot, experience higher wellbeing at work. Additionally, the employees' roles within the organization showed that those in relational positions or with greater alignment to Mindset report higher levels of workplace wellbeing.*

Therefore, these preliminary results indicated a strong correlation ($R = 0.755$), explaining 57% of the variance in Psychological Wellbeing in the secondary appraisals. The significant factors in this case were Economic Security, Accomplishment, Relationships, and Physical Health, all of which had a positive effect on psychological wellbeing. This suggests that employees who perceive positive impacts on economic factors, a sense of accomplishment, and their interpersonal relationships experience significant improvements in their psychological wellbeing.

Moreover, these preliminary results on emotions revealed that emotions such as Anger, Happiness, and Sadness significantly influence Psychological Wellbeing, Life Wellbeing, and Workplace Wellbeing dimensions, suggesting that the management and balancing of emotions in relation to daily challenges play a crucial role in overall wellbeing. Emotions, therefore, are not only indicators of psychological health but also key predictive factors in determining employees' responses to the introduction of technologies like AI. These emotional responses not only serve as indicators of psychological health but also appear to be key factors in shaping employees' coping mechanisms and, ultimately, their overall wellbeing (Lazarus & Folkman, 1984).

The perception of AI adoption as a challenge or threat played a crucial role in determining the coping strategies employed by employees. Those who perceived AI integration as a challenge were more likely to adopt problem-focused coping strategies, such as acquiring new skills, integrating AI into their workflows, and leveraging technology to enhance performance. This aligns with existing research, which suggests that individuals who view a situation as challenging are more likely to engage in proactive coping mechanisms, such as learning and problem-solving (Carver et al., 1989; Lazarus & Folkman, 1984). Conversely, employees who viewed AI adoption as a threat were more likely to rely on emotion-focused coping strategies, such as avoidance or stress-reduction techniques. When employees perceive AI as a threat to job security or autonomy, higher levels of anxiety, frustration, and other negative emotions are often experienced, leading to the use of emotion-regulation strategies (Aspinwall & Taylor, 1997). These findings underscore how emotional reactions to AI adoption can shape coping mechanisms and ultimately influence overall wellbeing.

In summary, the preliminary results suggest that the introduction of Copilot as an AI tool has a significant impact on employees' wellbeing, primarily influenced by the emotional and relational dimensions of the PERMA+ model. Positive Emotions, Accomplishment, and Economic Security were key determinants in shaping employees' wellbeing in this context. Additionally, emotions such as Happiness, Anger, and Sadness demonstrated correlations with overall wellbeing, highlighting the importance of emotional responses in shaping employee coping strategies and wellbeing.

Research limitations. *A primary limitation of this study is that it is still in the preliminary stages, with data collection ongoing. As such, the findings presented are based on an incomplete dataset, which may restrict the generalizability of the results. Additionally, the sample consists exclusively of employees from a single organization, which may introduce sampling bias and limit the extent to which the findings can be generalized to other organizations or industries. Furthermore, the study examines the introduction of a single AI technology, Copilot, which may not fully capture the range of employee responses to different AI tools or technologies. These factors may constrain the external validity of the study, indicating the need for further research to corroborate the findings and assess their broader applicability across different contexts and technological implementations.*

Managerial implications. *The findings of this study offer significant managerial implications for organizations seeking to effectively manage the introduction of AI technologies, such as Copilot, and to support employees through these transitions. A key insight is that emotional responses are integral to employees' overall wellbeing and their ability to adapt to technological innovations. Understanding the emotional dynamics associated with AI adoption is essential for managers, as emotions can substantially influence both the acceptance of new technologies and the long-term success of their integration within the organization. Organizations must recognize the pivotal role emotions play in shaping employees' experiences and outcomes during technological transitions. By addressing and actively managing these emotional responses, managers can foster an environment conducive to resilience and adaptability. Specifically, cultivating positive emotional experiences and ensuring employees perceive meaning and accomplishment in their work can enhance their capacity to embrace technological change. Additionally, considering the potential emotional barriers posed by employees' prior experiences with technology, organizations may benefit from implementing targeted interventions, such as comprehensive training programs and proactive emotional support. These initiatives should aim to alleviate negative emotions, such as anxiety or resistance, by providing clarity and transparency about the AI introduction and ensuring that employees feel supported throughout the transition.*

In conclusion, the results suggest that organizations must adopt a holistic approach when introducing AI technologies, one that considers not only the technical and operational aspects but also the emotional and psychological dimensions of the change process. By prioritizing the management of emotional responses and supporting employee well-being, organizations can facilitate a smoother integration of AI, thereby enhancing overall employee satisfaction, productivity, and organizational performance in the long term.

Originality of the paper. *This paper offers a distinctive and valuable contribution to the existing body of literature by investigating the emotional and psychological responses of employees to the introduction of AI technologies in the workplace. While much of the current literature primarily focuses on stressors and coping mechanisms, this study shifts the emphasis towards the cognitive appraisal process, particularly primary and secondary appraisals, which are fundamental in shaping employees' emotional reactions and overall wellbeing. By integrating well-established frameworks such as the PERMA+ model and the Employee Wellbeing Scale, the research provides a novel perspective on how employees assess AI-induced changes and the subsequent impact on their emotional and behavioral outcomes.*

Additionally, this study uniquely concentrates on the introduction of a specific AI tool, Copilot, and its effects on employee emotions, an aspect rarely addressed in the literature. This focus on the affective dimensions of AI adoption offers important insights into the psychological impacts of technology integration, particularly in relation to emotional responses such as positive and negative affect. The study enhances the understanding of how cognitive and emotional processes influence employees' adaptation to technological transformations in organizational contexts. Therefore, the originality of this study lies in its innovative approach to examining the interplay between cognitive evaluations, emotional responses, and AI adoption, thus advancing the understanding of the human experience in the face of technological change within the workplace.

Key words: *Artificial Intelligence; Employee wellbeing; Secondary Appraisals; PERMA+; Coping Strategies*

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How self-verification experiences and self-concept clarity jointly shape job applicants' responses to AI

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Abstract

Despite the growing use of artificial intelligence in hiring practices, job applicants remain hesitant about this technological solution. What factors contribute to the low acceptance rate, and are all job applicants equally impacted? Across three controlled experiments, we demonstrate that job applicants perceive lower self-verification (i.e., the degree to which individuals feel that others understand them based on their own self-perceptions) when evaluated by an AI (vs. a human) agent, which reduces their job acceptance intentions (Study 1). Study 2 demonstrates that the low perceived self-verification with AI evaluation agents decreases applicants' perceived person-organization fit (P-O fit) (i.e., the extent to which a person's core values and beliefs align with those of the hiring organization), thereby decreasing applicants' job acceptance intentions. Using a serial moderated mediation model, we show that these effects are stronger among job applicants who score high on self-concept clarity (Study 3). These findings enhance our understanding of the factors influencing applicants' job acceptance intentions regarding AI and offer practical insights for effectively integrating AI into hiring practices.

Framing of the research. *In recent years, advancements in artificial intelligence (AI) are transforming organizational culture and work processes (Volpentesta et al., 2023; Urbani et al., 2024); hiring practices are no exception (Deriu et al., 2024; Meijerink & Bondarouk, 2023). One such advancement is the implementation of AI evaluation agents to assess job applicants in a selection process (van Esch & Black, 2019; Mirowska et al., 2020). These AI-driven systems are increasingly utilized to automate key recruitment functions, including reviewing application documents, screening candidates, and analyzing job interview data (Cheng & Hackett, 2021). By streamlining these tasks, organizations can achieve greater efficiency, reducing travel costs and shortening time-to-hire (Brenner et al., 2016; Malik et al., 2023). This efficiency gain, alongside the broader digital transformation of workplaces, has fueled the rapid adoption of AI in recruitment and growing academic interest in its implications for hiring practices (Pan & Froese, 2021).*

Despite its rising popularity, AI-based selection processes remain controversial. Emerging evidence suggests that job applicants often react negatively to AI-driven hiring, with 71% of Americans opposing the use of AI in assessing job candidates (Rainie et al., 2023; Gonzalez et al., 2022). Indeed, efficiency alone does not necessarily determine the success of AI-driven selection processes, as individuals may prefer engaging with entities that they perceive as more relatable (Di Cioccio et al., 2024). As a result, organizations should consider not only the functional benefits of AI in hiring but also the psychological factors that influence candidate acceptance of this new technological solution.

Purpose of the paper. *This research enhances our understanding of the factors that influence job applicants' reactions to AI by providing a new explanation for why some applicants may respond negatively to AI usage in hiring and examining whether this response is consistent among different types of job applicants.*

We base our investigation on self-verification theory (Swann, 1987), which suggests that individuals strive to express their self-concept through their actions and adjust their behaviors to receive accurate social feedback. Self-verifiers prefer certainty and tend to avoid risks, seeing inaccurate interpretations from others as a threat (Cowan & Dai, 2014). Self-verification theory suggests that experiences related to self-verification can influence individuals' attitudes and behaviors (Booth et al., 2019; Gardner & Prasad, 2021). For example, Booth et al. (2019) found that employees' reactions to social undermining by supervisors-where a supervisor deliberately tries to obstruct employees' successes-can be predicted by their perceptions of self-verification and their feelings of being understood. However, despite the significance of self-verification in various organizational contexts, the effect of self-verification on job applicants' reactions to the use of AI in hiring has not yet been explored.

We propose that the subjective experience of self-verification may explain why job applicants tend to respond negatively to AI agents compared to human evaluators in terms of job acceptance intentions, which is a crucial hiring outcome that demonstrates an organization's capability to fulfill its labor needs (Harold et al., 2016). Specifically, we expect job applicants to feel less self-verified when assessed by an AI agent, as they may view it as less capable than

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humans in understanding their true selves, experiences, or personalities. Further, we believe that applicants' self-verification experiences will influence their behavioral intentions, such as job acceptance, by shaping their perception of how well they would fit with the hiring organization. This perception, known as Person-Organization (P-O) fit (Bretz & Judge, 1994), refers to the alignment between individuals' values, beliefs, and personalities and the organizational culture, norms, and values (Kristof, 1996). In particular, we expect job applicants to feel less understood and receive less accurate social feedback (i.e., lower self-verification) when evaluated by AI rather than a human evaluator. As a result, they might experience a decreased alignment between their values, goals, and personality and those of the organization. This misalignment could reduce the sense of Person-Organization (P-O) fit.

Furthermore, previous research indicates that individuals differ in their self-verification perceptions (Booth et al., 2019). Thus, individual differences may further influence how applicants' perceptions (e.g., self-verification) and behavioral intentions develop during the job selection process. One such difference might be self-concept clarity, which refers to the extent to which people have a clear and coherent sense of who they are-whether they perceive that the traits, goals, preferences, and beliefs, that make up their self-concept are internally consistent and remain stable over time (Anseel & Lievens, 2006; Emery et al., 2018). Drawing on self-verification theory, we propose that self-concept clarity can predict various perceptions in a selection process, particularly self-verification perceptions, depending on whether the evaluator is human or AI (Nash, 2023; Wang & Yu, 2022), subsequently influencing job applicants' responses to the selection process.

We conducted three experimental studies focused on employment interviews to test our hypotheses. In these studies, we developed scenarios in which applicants were evaluated by either human decision-makers or AI-based tools. Specifically, we focused on asynchronous video interviews, which are becoming an increasingly popular job interview in which applicants record videos of themselves answering a set of predetermined questions on camera (Deriu et al., 2024).

Figure 1. The full conceptual model with the associated studies.

Methodology. *The sample for Study 1 included 150 U.S. respondents (86 females, Mage = 36.95, SD = 11.80). Study 2 also involved 150 participants from the U.S. (79 females, Mage = 36.71, SD = 12.11). Data for Study 3 were collected from 241 U.S. respondents (180 females, Mage = 38.24, SD = 12.98).*

Participants were recruited through Prolific, with screening criteria ensuring they were actively seeking employment. Each study employed a 2 (evaluation agent: AI vs. human) × 1 between-subjects experimental design. Respondents were randomly assigned to one of two conditions. In the "Human Hiring Manager" condition, participants were told that a human hiring manager with over 10 years of experience would analyze and score their interview responses. In the "AI Evaluation Agent" condition, participants were informed that the company's AI algorithms, trained on 10 years of hiring

data, would assess their responses. Three manipulation checks confirmed that participants accurately perceived the evaluation condition to which they were assigned in each study.

All three studies used pre-validated Likert-scale items to measure self-verification (Amarnani et al., 2022) and job acceptance intentions (Highhouse et al., 2003). Additionally, Study 2 included a measure of perceived person-organization fit (Cable et al., 2012), while Study 3 incorporated self-concept clarity as a moderating variable (with higher scores indicating lower clarity), using items from Campbell et al. (1996). Mediation and moderation analyses were conducted using PROCESS macro models (Hayes, 2017)..

Results. *Study 1 revealed that the use of AI evaluation agents lead to lower job acceptance intentions compared to the human hiring manager (M_{AI} = 4.25 vs. M_{human} = 4.99, t (148) = 3.39, p < .001, d=0.55). Mediation analysis confirmed that AI negatively affected self-verification (b = -0.95, SE = 0.25, t = -3.79, p < .001), which in turn reduced job acceptance intentions (b = 0.46, SE = 0.06, t = -7.42, p < .001). The resulting 95% CI indicated the presence of a "full" mediation given the significant indirect effect (b = -0.43, 95% CI = -0.72, -0.19) and with the direct effect being not significant (b =- 0.31, 95% CI = -0.70, 0.08). As for covariates, we found no statistically significant effects of gender and age.*

Study 2 corroborated that AI evaluations lower job acceptance intentions (M_{AI} = 4.67 vs. M_{human} = 5.45, t (148) = 3.42, p < .001, d=0.56). Serial mediation analysis confirmed that AI negatively influenced self-verification (b = -1.01, SE = 0.24, t = -4.26, p < .001), which reduced perceived person-organization fit (b = 0.56, SE = 0.06, t = 9.42, p < .001), ultimately decreasing job acceptance intentions (b = 0.54, SE = 0.08, t = 6.50, p < .001). Moreover, the indirect effect (b = -0.31, 95% CI = -0.52, -0.15) led the direct effect to become not significant (b = -0.31, 95% CI = -0.68, 0.06), indicating the presence of a "full" mediation. Results remain unchanged even after controlling participants' gender and age.

Study 3 confirmed that the AI evaluation agent generated lower job acceptance intentions compared to the human hiring manager (MAI = 4.86 vs. Mhuman = 5.41, t (239) = 3.18, p = .002, d=0.41). In addition, results revealed that the negative effect of the AI evaluation agent on candidates' self-verification was characterized by the significant and positive interaction with candidates' self-concept clarity (b = 0.35, SE = 0.14, t = 2.52, p = 0.013). Candidates with a clear self-concept preferred human evaluations. However, this difference disappears for candidates with lower self-concept clarity, who show no significant preference between being evaluated by the AI or a human. Specifically, individuals with self-concept clarity below 2 (i.e., very clear self-concept) perceived AI as significantly less capable than human evaluators (b = -1.15, SE = 0.29, t = -3.94, p < .001), whereas those above 5 (i.e., very unclear self-concept) perceived no difference (b = -0.11, SE = 0.27, t = -0.39, p = 0.695). Moreover, we found a significant moderated mediation on job acceptance intentions (index of moderated mediation = 0.08, 95% CI = 0.009, 0.178). The effect was sequentially driven by the impact of self-verification on perceived person-organization fit (b = 0.66, SE = 0.04, t = 15.48, p < .001), which finally affected job acceptance intentions (b = 0.36, SE = 0.07, t = 5.23, p < .001). As for the previous studies, age and gender had no significant impact.

Research limitations. *Our work has limitations that can provide guidance for future research. To make the information about the two evaluation agents comparable, we provided a straightforward description of the AI agent, specifically focusing on evaluating job interview performance. However, companies can consider additional features of AI. For instance, recent advancements in AI allow for assessing job applicants' personalities. Therefore, future research could conduct a more detailed investigation into how different AI features influence job applicants' responses.*

Second, our studies converged in showing that self-concept clarity affects job applicants' responses to AI. Future research should explore the influence of additional factors, such as how individuals manage their emotions in interpersonal contexts (Burley et al., 2020) and cultural factors, such as collectivism (Ma et al., 2024). Job applicants who are high in collectivism may have lower job acceptance intentions in AI-based selection processes compared to human-based ones, as they value human interaction more than interactions with machines.

Third, we recommend future research to investigate applicants' behavioral intentions toward AI evaluation agents while considering the role of contextual factors, such as the type of company they are applying to (e.g., international vs. domestic) (Galli & Majocchi, 2023; Mirowska & Mesnet, 2021).

Managerial implications. *The growing integration of AI in recruitment brings both advantages and challenges for organizations. While AI-powered hiring tools can improve efficiency and reduce costs (Malik et al., 2023), our research highlights key psychological factors that shape job applicants' acceptance of AI-driven selection processes.*

First, our findings emphasize the importance of integrating mechanisms that enhance self-verification in AI-driven hiring. Because AI lacks the interpersonal engagement of human-led evaluations, applicants may feel that their true selves are overlooked. Organizations should consider implementing AI systems that provide personalized and detailed feedback to counter this, reinforcing candidates' self-verification experiences. For example, AI-generated evaluations could offer tailored explanations of how applicants' skills and experiences align with job requirements, rather than presenting generic assessment results. For instance, Amazon has already started enhancing its recruitment process by leveraging conversational AI to deliver real-time, adaptive candidate feedback (Pant, 2024).

Second, this study highlights the moderating effect of self-concept clarity (SCC), suggesting that organizations could adopt more flexible recruitment strategies that allow candidates to choose their preferred evaluation method based on their SCC levels. A practical example of this approach is Unilever's AI-driven hiring process, where candidates can decide whether they want to be assessed by an automated system (AI) or a talent adviser (human recruiter) (The Guardian,

2019). This strategy aligns with our findings, enabling self-selection based on candidates' psychological traits, such as SCC. By offering this choice, Unilever effectively implements a candidate-driven segmentation approach, balancing efficiency with individual differences in self-verification needs. Alternatively, organizations could assess SCC levels early in recruitment to determine the most suitable evaluation method for each candidate. This could be achieved through brief pre-assessment questionnaires using validated SCC measurement scales (e.g., Campbell et al., 1996). While implementing these assessments may require additional resources, the long-term benefits, such as improved hiring decisions, lower turnover, and reduced organizational costs, may outweigh the initial investment. Research suggests that early-stage psychological assessments enhance candidate selection, ultimately leading to better hiring outcomes (Laurano, 2015; Mathews & Redman, 2001). Similarly, Roulin and Levashina (2019) found that personality and psychometric assessments provide valuable insights into candidates' traits, improving the selection process and leading to more successful recruitment. Organizations may ultimately increase job acceptance rates by tailoring hiring methods to align with candidates' psychological traits, a strategy consistent with prior research showing that identity-related factors play a crucial role in shaping attitudes and decision-making processes (e.g., Donato et al., 2024).

Originality of the paper. *Our research makes several contributions to the literature on the factors influencing AI acceptance in hiring practices (Mirowska, 2020). As AI becomes more prevalent in evaluating job applicants, it is essential for managers to understand the psychological factors that influence job applicants' reactions to AI-based versus human-based selection processes. While previous research on AI in hiring has explored various factors influencing AI acceptance, such as fairness (Noble et al., 2021) and trust (Deriu et al., 2024), the concept of self-verification has been overlooked. Self-verification theory (Swann, 1987) suggests that individuals need to express their self-concept through their actions to receive accurate social feedback. This need is critical in understanding people's responses in organizational settings (Booth et al., 2019; Smith et al., 2021). Accordingly, we built upon the self-verification theory (Swann, 1987) and contributed to the AI recruitment literature by demonstrating that self-verification experiences significantly influences applicants' job acceptance intention with AI (vs. human) evaluation agents. By doing so, we expanded the theoretical lens of research (Gilliland et al., 1993; Oostrom et al., 2023) on job applicants' responses to AI usage in hiring practices by introducing a new theoretical framework to this emerging technological selection context.*

Second, building on previous research that indicates individual differences can influence how applicants' perceptions (such as self-verification) and behavioral intentions evolve during the selection process (McCarthy et al., 2017), we drew on self-verification theory (Swann, 1987) to show that the negative impact of using AI to evaluate applicants in job interviews depended on their self-concept clarity. In doing so, this also contributes to the literature on the role of individual differences in hiring practices (McCarthy et al., 2017). Specifically, job applicants who scored high in self-concept clarity reported experiencing less self-verification when evaluated by an AI agent, which resulted in a lower likelihood of accepting a potential job offer. One possible explanation for this phenomenon is that individuals with a clear and consistent understanding of themselves may believe that an AI evaluation cannot provide personal feedback that aligns with their self-image. As a result, they might feel that the AI's assessment does not accurately reflect or validate their self-perception. Consequently, they may be more inclined to value a human's judgment over that of an AI.

Third, we enriched our knowledge of the factors influencing job acceptance intentions (Harold et al., 2016). Our findings reveal that job applicants perceive a lower alignment-specifically, Person-Organization (P-O) Fit-between their values, beliefs, and personality and those of the hiring organization when being evaluated by an AI agent instead of a human agent. This misalignment contributes to a decrease in their intentions to accept a job offer.

Finally, by examining both job applicants' perceptions and individual differences (McCarthy et al., 2017), our research model facilitates theoretical advancements that can improve hiring managers' understanding of the factors influencing applicants' acceptance of AI. This, in turn, offers practical insights for hiring managers seeking to integrate AI into their selection processes and aims to reduce candidates' resistance to this increasingly common technology.

Keywords: *recruitment; artificial intelligence; self-verification; self-concept clarity; job acceptance*

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Data Discrimination and Algorithmic Challenges in AI copilots. A systematic literature review

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Abstract. *The rapid evolution of Artificial Intelligence (AI) has significantly impacted various sectors, including business, healthcare, and education. While AI offers enhanced efficiency and decision-making capabilities, it also raises critical ethical concerns, particularly regarding embedded biases. AI copilots, which function as virtual assistants in managerial decision-making, exemplify these challenges by integrating algorithmic biases influenced by societal norms, which can restrict open discussions on sensitive issues. This study seeks to systematically examine the presence of biases in AI copilots within managerial contexts, differentiating between biases originating from data and those stemming from algorithmic structures. Furthermore, it aims to develop effective mitigation strategies to deepen the understanding of bias propagation within AI systems. Utilizing a qualitative approach based on a systematic literature review, the research analyzes data extracted from selected academic sources to organize and synthesize key findings. The study identifies biases occurring across all phases of both the data lifecycle and the AI system lifecycle, highlighting their potential impact on managerial decision-making. Through a structured mapping and analysis, the research pinpoints the specific stages where biases are most prevalent and explores the factors contributing to their persistence. By offering a comprehensive perspective on bias formation and its consequences, this research provides valuable insights into AI ethics and its implications for organizational governance.*

Framing of the research. *Generative Artificial Intelligence (AI) has become increasingly relevant in managerial entrepreneurship due to its advanced learning and language processing capabilities (Gupta, 2024). It has been recently incorporated into Business Intelligence (BI) systems, enhancing data collection, analysis, and decision-making processes (Al-Eisawi et al., 2020). By leveraging these capabilities, generative AI is transforming business decision-making processes, positioning itself as an essential support tool, often referred to as a "copilot" for managers (Lim et al., 2023). AI copilots, acting as intelligent virtual assistants, assist managers in automating tasks, analyzing data, and improving operational efficiency (Dakhel et al., 2023).*

Despite these advantages, AI copilots also introduce ethical and operational concerns. Studies indicate that biases in training datasets can lead to discriminatory outcomes, particularly in hiring, where AI copilots have been found to favor male candidates based on historical hiring trends (Obermeyer et al., 2019; Varsha, 2023). In addition to biases derived from training data, AI copilots may also exhibit algorithmic vulnerabilities. Studies have shown that, through specific interactions, algorithms can be manipulated to bypass security measures, leading to unintended and potentially harmful responses, such as the disclosure of sensitive or illicit information (Jiang et al., 2024).

Biases in AI copilots can stem from both data and algorithmic structures, yet existing research does not always clearly distinguish between these sources. To bridge this gap, the present study aims to classify biases systematically. With reference to those originating from training data, we follow the framework proposed by Ashmore et al. (2021) to examine the key stages of dataset construction.

The framework consists of four primary stages (Figure 1): A. Data Management, B. Model Learning, C. Model Verification, and D. Model Deployment. Each of these stages is further broken down into specific phases to provide a more detailed and practical understanding of the AI copilot lifecycle.

Stage A focuses on Data Identification and Collection (A1) as well as Data Cleaning and Preparation (A2), underscoring the necessity of establishing a precise and dependable data foundation for AI copilots. Following this, Stage B covers Data Exploration and Analysis (B1) along with Modeling (B2), emphasizing the iterative nature of model

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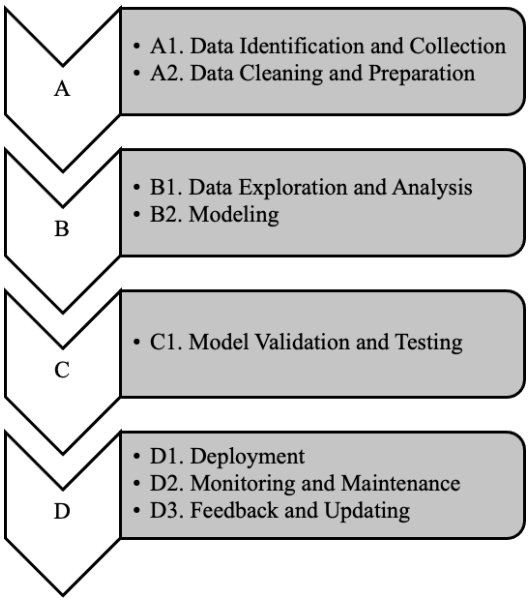
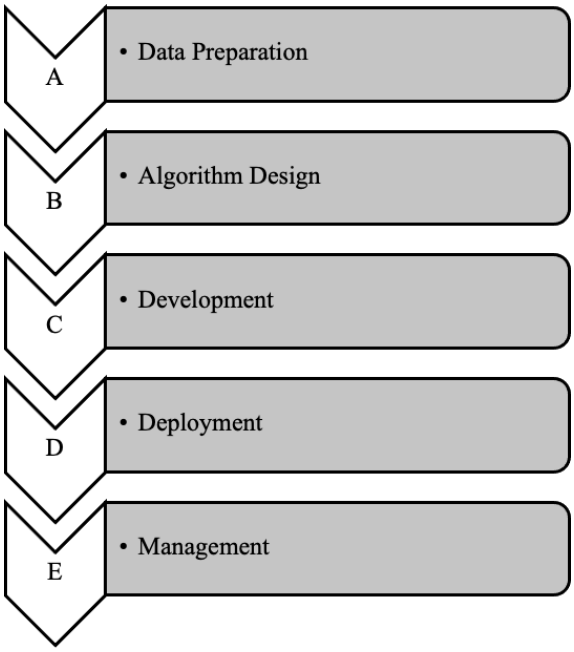
development, which progresses from an initial data assessment to the model's construction. Stage C integrates the Model Validation and Testing phase (C1), ensuring that the models perform effectively and fairly across diverse operational scenarios by evaluating their robustness and reliability. Finally, Stage D comprises Deployment (D1), Monitoring and Maintenance (D2), and Feedback and Updating (D3), forming an ongoing cycle aimed at continuously refining and optimizing the model's performance in real-world applications.

Fig. 1: Data Lifecycle



Biases stemming from algorithms tend to emerge when AI copilots do not comply with established ethical standards and frameworks for AI governance (Thiebes et al., 2020). The European Union's ethical framework for trustworthy AI mandates that AI copilots adhere to three core principles: compliance with existing legal regulations, including privacy, data protection, and anti-discrimination laws (Lawful); alignment with ethical norms that reflect the moral values upheld by society (Ethical); and effective functionality that minimizes errors and mitigates failure risks (Robust) (European Commission, 2019). Regarding algorithmic biases, various models have been proposed in the literature to outline the AI system lifecycle. For this study, the model developed by Li et al. (2023) (Figure 2) has been adopted, which comprises five fundamental stages: A. Data Preparation, B. Algorithm Design, C. Development, D. Deployment, and E. Management.

Fig. 2: AI system lifecycle



Purpose of the paper. *By conducting a systematic review of existing literature, this study aims to categorize and analyze the biases that emerge in AI copilots, differentiating between those stemming from data and those originating*

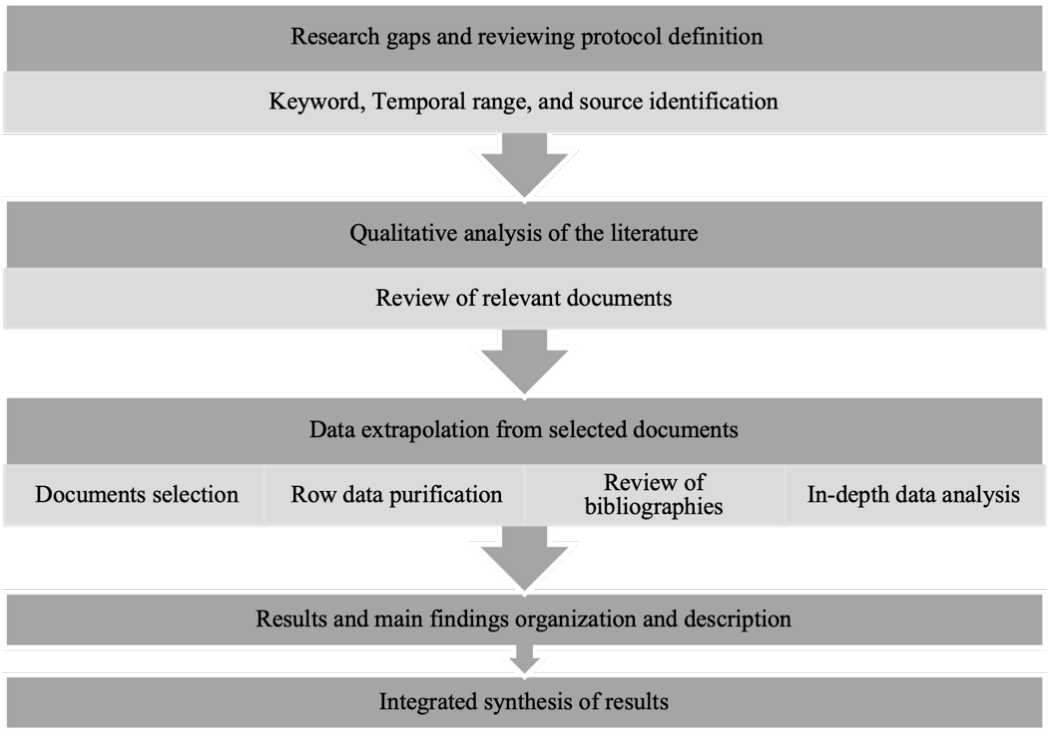
from the algorithm. Additionally, it seeks to determine the specific stages within the AI copilot lifecycle where these biases appear, investigate the factors contributing to their persistence, and propose strategies for their mitigation. This approach not only enhances the understanding of bias formation and evolution but also contributes to the broader academic discussion on bias dynamics within AI copilots. As a result, this research is structured around the following central research question:

RQ: What biases affect AI copilots, and what are their sources?

Methodology. *To investigate the research question, a systematic literature review was conducted following the qualitative methodology outlined by Tranfield et al. (2003). The study was developed through a structured process that began with the identification of gaps in the existing literature and the formulation of a research protocol. This phase involved recognizing the necessity of a review, defining the scope of analysis, preparing a detailed research proposal, and establishing a methodological framework for conducting the literature review.*

Following this initial phase, a qualitative analysis of relevant academic contributions was undertaken. This step focused on examining previous studies related to biases in the data lifecycle, ensuring that the selected literature aligned with the research objectives. Once the key documents were identified, data extraction and synthesis were carried out, allowing for the collection of relevant insights from the selected studies. Finally, the findings derived from the review process were systematically organized into a comprehensive report, ensuring that the results were effectively structured and communicated. Figure 3 provides a visual representation of this structured approach, outlining the main phases and their corresponding sub-phases.

Fig. 3: Flow Chart of the literature review process



In the first phase of the study, both the research problem and the methodological strategy were defined. This involved gathering information relevant to biases in the data lifecycle and establishing precise criteria for selecting and excluding studies. The search strategy was developed based on established guidelines for systematic reviews, particularly those proposed by Davies and Crombie (1998). To determine the most frequently used terminology in scholarly research on data lifecycle and biases, a focus group was conducted. Eight experts participated, with equal representation from the fields of marketing and management, as well as informatics. These specialists were first asked to compile a list of at least ten terms associated with the study of aging and technology.

To ensure a thorough review of academic research, only peer-reviewed journal articles published in English within the fields of economics and business were considered. The literature search was conducted using Scopus, a widely recognized indexing and abstract database that provides access to a comprehensive collection of academic sources. The decision to utilize Scopus was based on its ability to offer an extensive selection of research articles while also enabling advanced filtering and analytical tools (Franceschet, 2010). Once the relevant studies were retrieved, the selection process continued with a review of documents that contributed meaningfully to the conceptual framework. The selection

approach followed the methodology proposed by Tranfield et al. (2013), prioritizing studies that specifically addressed bias in the data lifecycle.

Following this selection process, data analysis was conducted through a systematic extrapolation of key findings. A structured research framework was applied to examine specific elements of each study, including its central theme, the methodology used for data collection and analysis, and the nature of the research, whether qualitative, quantitative, or review-based. In refining the dataset, overlapping studies were analyzed, and a data purification process was applied to remove redundancy and ensure the relevance of the selected documents. As a result of this filtering process, a final dataset of documents published between 2014 and 2023 was obtained.

In the final phase of the literature review, each selected study was carefully examined to verify its alignment with the research objectives. Additionally, the bibliographies of these articles were manually reviewed to identify further relevant sources. During this phase, articles that did not meet the established content criteria were excluded from the analysis. The remaining studies were systematically reviewed following the methodology proposed by Bal & Nijkamp (2001), ensuring a structured synthesis of findings. This analytical process resulted in a final selection of contributions, providing valuable insights into the presence of biases across various stages of both the data lifecycle and the broader AI system lifecycle.

Results. *The presence of biases has been observed at various stages of the data lifecycle, influencing the development and performance of AI copilots. Within the Data Management phase, particularly in the Data Identification and Collection (A1) phase, biases begin to emerge early in the process, shaping both the training and overall effectiveness of AI models. Flawed sampling methods can distort datasets, leading to inaccurate AI copilots (Adomavicius & Yang, 2022). Similarly, Chhillar & Aguilera (2022) argue that decisions made during dataset design can introduce biases, reducing transparency and reinforcing systemic prejudices within AI copilot applications.*

In the data cleaning and preparation (A2) phase, removing anomalies may inadvertently eliminate crucial information, exacerbating Data Distribution Bias (Adarsh et al., 2023). Normalization and standardization processes, if not carefully managed, can obscure underrepresented groups, amplifying structural inequalities (McDonald & Pan, 2020). During phase of Data Exploration and analyses (B1), analytical techniques can introduce biases that distort AI copilot interpretations. Chu et al. (2023) identify Aggregation Bias, where visualization tools like histograms and heat maps oversimplify data, masking differences between groups. This generalization can lead AI copilots to misrepresent diverse populations, reducing model accuracy and fairness. During the phase of modeling (B2), methodological challenges arise. Errors such as conflating correlation with causation or excessive generalization can lead to Method Bias, where the chosen approach fails to distinguish influences within the dataset (Akter et al., 2021). Additionally, Model Bias occurs when machine learning models do not adequately reflect real-world complexity, leading to misrepresentations (Akter et al., 2023). Despite extensive research, a comprehensive understanding of how biases evolve within AI modeling remains lacking.

In the model validation and testing (C1) phase, Algorithmic Bias can emerge, reflecting societal stereotypes embedded in AI development. These biases often result from the perspectives of developers, leading to unfair outcomes for specific groups (Bhavani & Thuraisingam, 2022; Sanclemente, 2021). If validation datasets do not adequately represent diverse populations, models risk perpetuating systemic inequalities. Once AI copilots are deployed (D1), biases can become more pronounced due to interactions between technology, society, and data. Societal Bias emerges when models trained on historical data with cultural and demographic prejudices reinforce existing discrimination (Akter et al., 2021). AI copilots may generalize based on past patterns, overlooking marginalized groups and intensifying disparities. The Monitoring and Maintenance (D2) phase plays a crucial role in preserving the effectiveness and reliability of AI copilots over time, yet there is limited research on how biases evolve at this stage. Scholars generally agree that biases appearing at this stage are influenced by multiple factors, including the evolving nature of operational environments and continuous updates to data sources (Sanclemente, 2021). The reliance on outdated, incomplete, or biased data further complicates the challenge, making it necessary to implement ongoing oversight to detect and correct distortions (Akter et al., 2023). In the Feedback and Updating (D3) phase of the data lifecycle, AI copilots are refined based on user interactions and real-world feedback. However, Biases can persist and even be reinforced through user interactions and feedback loops. Feedback Bias occurs when AI models reinforce existing prejudices instead of correcting them (Van Giffen et al., 2022). Effective mitigation strategies should integrate feedback as a core component of evaluation and refinement. Other scholars highlight this issue as User Interaction Bias, emphasizing the risks of unintentional bias reinforcement through iterative AI learning (Pagano et al., 2023).

Furthermore, Biases have been identified even throughout the various phases of the AI system lifecycle, influencing the development and application of AI copilots. In the initial phase of Data Preparation (A), when AI copilots process data to generate responses, there is an inherent risk of producing unfair, discriminatory, or ineffective decisions, which can ultimately compromise the robustness and reliability of the system (Richardson, 2022). As demographic misrepresentations, particularly regarding gender, can reinforce stereotypes and systemic discrimination (Edwards & Rodriguez, 2019). During the subsequent phase of Algorithm Design (B) of the AI system lifecycle, there is a considerable risk that designers and developers may inadvertently introduce their own biases into, AI copilots further amplifying discrimination based on gender, race, or disability (Bhavani & Thuraisingam, 2022; Chen, 2023). For example, AI assistants with female voices often reflect societal stereotypes, reinforcing subservient roles (Schillaci et al., 2024). Social Bias has also been identified in AI visual labeling, where women are disproportionately linked to domestic tasks, necessitating dataset adjustments to achieve balance (Zhao et al., 2017). Lack of human oversight in algorithm selection

can also contribute to Algorithmic Bias (Adomavicius & Yang, 2022). As AI systems progress to the next phase of Development (C), additional biases emerge that can undermine their reliability and overall performance. Overfitting occurs when AI models become overly dependent on specific training data, reducing their ability to generalize to new scenarios (Domínguez Figaredo, 2020; Schwartz et al., 2022). Furthermore, training in controlled environments often fails to reflect real-world conditions, leading to inconsistent and discriminatory outputs (Gao et al., 2022). Human interactions also introduce distortions, as operators may influence AI behavior through biased inputs or limited test scenarios (Bartlett & Li, 2019; Chen, 2023; Chhillar & Aguilera, 2022). Ensuring the explainability of AI copilots becomes particularly crucial in the deployment (D) phase. Stakeholders need to comprehend the reasoning behind AI-generated decisions, particularly in high-stakes applications such as medical diagnostics. When AI copilots are used to assess patient symptoms and physical characteristics, their inferential processes must be entirely transparent to guarantee diagnostic accuracy and reliability (Morley et al., 2020). In the final phase of Mangement (E), bias risks persist, particularly Automation Bias, where users overly trust AI-generated decisions without critical evaluation (Adomavicius & Yang, 2022). Another major issue is Feedback Loop Bias, where AI models continuously learn from their own biased recommendations, reinforcing errors over time (Van Giffen et al., 2022).

Research limitations. *A key limitation of this study arises from the diverse range of literature analyzed, which spans multiple industries rather than concentrating on a single sector. While this broad approach enables the identification of common patterns across different domains, it also presents the risk of drawing generalized conclusions based on specific contexts. Additionally, the presence of overlapping biases presents another challenge. Different researchers may refer to the same type of bias using varying terminology, leading to potential duplications.*

Managerial implications. *The findings clearly indicate that AI copilots are susceptible to generating multiple forms of bias throughout their system lifecycle and during the dataset creation process. These biases can take on various forms, including territorial (Weissglass, 2022), gender-based (Scheuerman et al., 2019), cultural (Murphy et al., 2021), ethnic (Chouldechova et al., 2018), demographic (Fountain, 2022), and historical biases (Gerdon et al., 2022). Despite substantial documentation on these issues, managers who integrate AI copilots into decision-making processes frequently fail to recognize these biases, inadvertently embedding them into organizational operations, which can lead to significant negative consequences (Brendel et al., 2021). One of the primary reasons managers struggle to detect these biases is their lack of personal experience with the discrimination certain groups face. This highlights the necessity of fostering diverse teams in the workplace, which can enhance awareness of bias-related issues and contribute to a more equitable and inclusive environment. To mitigate the risk of discrimination, managers must also develop an understanding of the technical constraints of AI copilots and implement governance strategies that balance operational efficiency with principles of organizational and social justice. This requires consideration of ethical, legal, and societal factors in AI adoption (Brendel et al., 2021). The responsible and ethical deployment of AI copilots demands a comprehensive strategy that integrates proactive measures across different levels of an organization. Companies should establish stringent monitoring frameworks, implement rigorous oversight mechanisms, and ensure that all AI-driven decision-making processes are transparent (Nah et al., 2023; Heinrichs, 2022).*

Originality of the paper. *Although the literature on AI biases is vast, few studies systematically differentiate biases by their origin. This study introduces a clear distinction between data-derived biases and algorithm-intrinsic biases, filling a methodological gap in the classification and analysis of these distortions. Furthermore, we propose original frameworks that allow for the classification of biases along the entire lifecycle of data and AI systems, thus providing an analytical basis to more precisely identify at which stages biases manifest themselves and how they can be mitigated.*

Keywords *Business, Copilot, Bias, Artificial Intelligence (AI).*

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Lights and Shadows in the Governance of Generative AI Firms: a preliminary approach

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Abstract

The emergence of Generative Artificial Intelligence (AI) has accelerated the growth of the AI sector, transforming business processes and redefining corporate decision-making. This paper examines the complex relationship between AI and governance through a multidimensional lens, emphasizing its non-linear nature. We identify three principal dimensions that form a triangular framework: Governance with AI, referring to the integration of AI into corporate decision-making; AI governance, encompassing regulatory frameworks that shape AI development; and Governance of AI firms, which examines internal governance models balancing innovation, profitability, and ethical concerns.

Our analysis focuses specifically on the governance of AI firms, highlighting the factors that influence their structural choices. Through a qualitative investigation, this study identifies key governance models, including profit-distributing nonprofits (e.g., OpenAI), trust-controlled corporations (e.g., Anthropic), and open-source oriented organizations (e.g., Mistral). The findings suggest that governance structures are shaped by company size, geographic location, regulatory environment, and software distribution models (open-source vs. proprietary).

This research offers valuable implications for AI stakeholders, suggesting that organizations should develop governance frameworks that balance innovation with ethical considerations while adapting to their specific market contexts. Larger companies, particularly those with proprietary models, should prioritize robust oversight mechanisms to build stakeholder trust.

This study introduces an innovative tripartite analytical framework to examine the governance structures of generative artificial intelligence providers. This analysis, conducted in a research area that is still relatively under-investigated, aims to fill existing gaps in the scientific literature. Through this original approach, the study offers new perspectives on the governance dynamics that shape the generative AI industry, providing a significant contribution to the understanding of this rapidly evolving sector.

Key words: *Generative AI, Corporate Governance, Artificial Intelligence Ethics, AI Regulation, Open-Source AI.*

Framing of the research. *Artificial Intelligence (AI) is transforming the anthropic world, driving innovation in science, economies and society itself. AI in the economy is changing the way corporations make decisions and manage processes. Corporations use AI to automate their processes and improve their decision-making process.*

To clearly explain the key concepts covered in the present paper, it is necessary to provide a definition of AI. Russell and Norvig define it as "the study of [intelligent] agents that receive precepts from the environment and take action. Each such agent is implemented by a function that maps percepts to actions, and we cover different ways to represent these functions, such as production systems, reactive agents, logical planners, neural networks, and decision-theoretic systems" (Russell and Norvig 2010, p. viii). Generative AI is defined by Ramdurai and Adhithya as "an artificial intelligence field that concentrates on generating new and original information by machine learning on massive databases of experiences" (Ramdurai and Adhithya, 2023, p. 1). This definition highlights the core function of generative AI, which relies on extensive datasets to produce novel outputs through machine learning techniques.

The introduction of advanced Generative AI tools, such as ChatGPT in 2022, has made AI more accessible to a broader audience, including employees, managers, and entrepreneurs with limited technical expertise. However, the widespread adoption of these tools is hindered by a lack of adequate digital skills, limiting the effectiveness of AI integration within businesses and reducing its transformative impact.

This lack of competence is also evident in the decision-making process, particularly in the field of Corporate Governance. As AI enables more data-driven decision-making, the limited expertise of Top Management and the Board constrain its full potential, hindering the effective integration of AI into corporate strategies (Agnese et al., 2025).

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The relationship between AI and governance is neither linear nor one-dimensional; rather, it is shaped by multiple actors and forces pushing in divergent and sometimes conflicting directions. This relationship can be understood as a triangle (see Figure 1), with the three key dimensions positioned at its vertices.

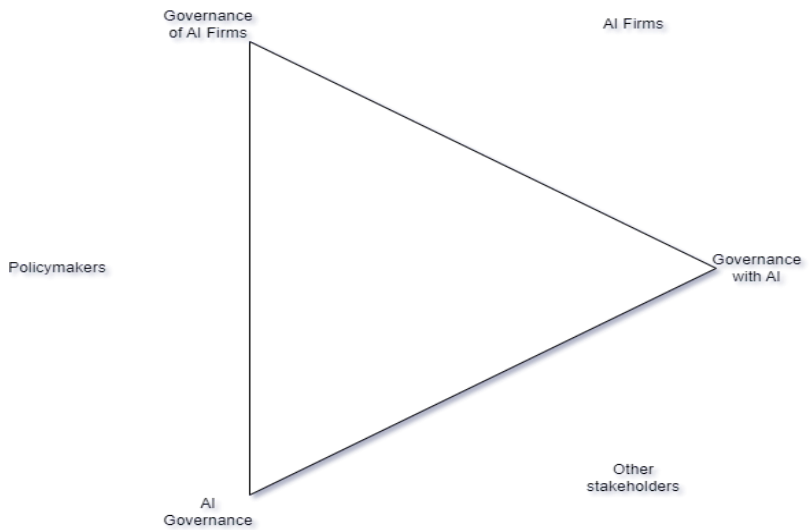
First, Governance with AI refers to the integration of AI solutions into Corporate Governance. In this vein, AI is primarily employed for financial tasks, such as data analysis and report generation to support investment decisions, as well as risk identification to anticipate financial stress or bankruptcy (Bae, 2012). It plays a crucial role in fraud detection (Xu et al., 2023), helping to combat money laundering, terrorism financing, and ensuring compliance among employees and management. In the Environmental, Social, and Governance (ESG) domain, AI provides recommendations on sustainability strategies (Raza et al., 2022). Finally, it enhances board performance by automating repetitive processes, managing board activities, assisting in director selection and improving board diversity (Eroğlu and Karatepe Kaya, 2022) and generating reports and insights (Ahdadou, 2024).

Second, AI Governance represents the efforts of policymakers to regulate AI-related phenomena-often under the influence of major tech corporations-despite an incomplete understanding of the technology's full implications. While the United States is characterized by a more flexible and less restrictive regulatory approach to AI, the European Union has adopted a more interventionist legislative framework. The U.S. introduced multiple regulatory initiatives to govern AI development and use. Among the most significant federal measures are the National AI Initiative Act (2020), the Blueprint for an AI Bill of Rights (2021), and, most recently, the Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence (2023). In contrast, the European Union has pursued a more stringent regulatory path. Key legislative measures include the Ethics Guidelines for Trustworthy AI (2019) and the AI Act, approved in 2024, which represents the most comprehensive legal framework on AI globally. One key difference between these approaches is that U.S. regulations do not appear to hinder AI market growth, whereas the EU's regulatory framework raises concerns about its effectiveness and potential negative impact on the European AI sector. The primary risk associated with this new regulatory structure is that it may slow down AI development, creating a competitive disadvantage for the European market compared to China and, most notably, the United States (Musch et al., 2023).

Third, Governance of AI Firms focuses on the internal governance structures, mechanisms, and processes within AI companies themselves. This dimension examines how AI firms balance innovation, profitability, and ethical considerations, as well as the ways in which their governance frameworks shape the broader AI ecosystem.

By analyzing these three interconnected dimensions, it appears evident that AI and governance are engaged in a dynamic and reciprocal interplay, where regulatory pressures, technological advancements, and corporate governance models continuously influence and reshape one another.

Fig. 1: The three interconnected dimensions that drive AI and Governance relationship



Source: Authors' elaboration

Artificial Intelligence companies have developed various governance structures to balance profit motives with their stated missions of developing safe, beneficial AI.

Oudin and Groza (2024) outline five different governance models for AI companies.

The first identified model is the "Profit-Distributing Nonprofit". OpenAI, the creator and the owner of the generative AI solution ChatGPT, adopts this model. From a governance perspective, OpenAI exemplifies a hybrid structure: it was, in fact, initially founded as a nonprofit but later adopting a mixed model to attract private investment while maintaining a public-benefit mission. Its governance is split between OpenAI Nonprofit, which oversees its mission, and OpenAI Global LLC, a for-profit entity with a capped profit model (Weiss, 2024) to balance financial sustainability and ethical

commitments. However, governance challenges, such as the dismissal and reinstatement of CEO Sam Altman (O'Brien and Hadero, 2024), have raised concerns about the board's independence and the influence of major investors like Microsoft. Critics argue that OpenAI's governance model lacks transparency and may struggle to uphold its public-interest objectives amid market pressures, highlighting the need for stronger oversight mechanisms.

The second identified model is the "Bounded For-Profit Controlled by a Trust". Anthropic adopts this model and emerges in this vein as one of the primary alternatives to OpenAI, implementing a distinctive governance structure centered around a Long-Term Benefit Trust (LTBT) to ensure that AI development remains aligned with the public interest (Ayana and Thompson, 2024). Unlike traditional corporate models, Anthropic is structured as a Public Benefit Corporation (PBC), a legal framework that enables the company to balance profit generation with broader societal objectives. At the core of its governance model, the Long-Term Benefit Trust (LTBT) holds Class T shares, which do not carry financial rights but grant governance authority (Schuett et al., 2024). Over time, the trust will gain a majority on the board of directors, ensuring that corporate decisions prioritize AI safety over short-term financial gains. While major investors such as Google and Amazon have provided funding, the LTBT structure prevents them from exerting direct control over the company's governance. This governance model is designed to establish a stronger accountability mechanism compared to OpenAI, safeguarding Anthropic's mission from commercial pressures while maintaining its commitment to ethical AI development.

The third case concerns Benefit Corporations. For example, Inflection AI and xAI have registered under this legal structure, which allows companies to pursue a public-benefit mission while remaining for-profit entities.

The fourth identified model is that of European AI companies, which have not implemented any governance structures to ensure the ethical and safe development of AI, despite expressing their intention to operate in this direction. Aleph Alpha claims to uphold ethical AI practices but does not specify any corporate safeguards ensuring their implementation. NXAI, an Austrian AI firm, is structured as a joint venture with significant founder influence. While it commits to European ethics and values, it has not disclosed specific governance mechanisms to uphold them (Oudin and Groza, 2024).

Finally, some companies do not believe that AI can evolve in harmful or dangerous ways. As a result, having no concerns regarding its ethics or safety, they have chosen not to modify their governance structure in any way. Mistral, a French AI startup, takes a distinctly different approach to AI development compared to companies like OpenAI. Rather than emphasizing ethical considerations or safety in its mission statement, Mistral focuses primarily on creating open and customizable AI technologies. The company has positioned itself as a provider of open-weight models intended for business and developer use, deliberately avoiding the direct-to-consumer application market.

This business model reflects a philosophy where Mistral appears to distance itself from responsibility for how its technology is ultimately deployed, as it provides tools that others can freely modify and implement. This stance has sparked debate in the AI governance community: some advocate that companies offering open-source AI solutions should be granted exemptions from liability, while critics question whether this approach adequately addresses the potential risks associated with AI deployment.

When examining AI service provider governance structures, understanding the key factors driving their development is crucial. The fundamental choice between open-source and proprietary approaches significantly shapes these structures. Open-source systems are "software for which the source code is open and available" (Comino and Manenti, 2003, p. 2). The term "open" refers to the capability for everybody to read and modify the source code, while "available" implies that anyone can use it for free or at a nominal price. Closed-source software, on the other hand, refers to software that is not made publicly available, with the source code remaining the intellectual property of the company or individual that developed it. Mistral illustrates this dynamic clearly: its decision to embrace an open system model reflects a business philosophy that appears to place less emphasis on controlling the security and ethical implications of its technology after release. This approach contrasts sharply with companies that maintain proprietary systems, allowing them to exercise greater ongoing control over how their AI technologies are implemented and used.

Purpose of the paper. *The purpose of the present working paper is to undertake a comprehensive analysis of the governance structures of companies that provide Generative AI solutions, with a particular focus on the differing models of governance utilized by these organizations. This study will explore key areas that influence how these companies operate and develop their technologies while aiming to balance profit motives with ethical obligations. Specifically, the research will focus on four main objectives.*

First, it will examine the different governance models adopted by AI provider companies, like OpenAI and Anthropic, highlighting best practices that ensure operational efficiency while adhering to ethical standards. This is particularly relevant given that recent developments, such as generative AI tools like ChatGPT, have democratized access to AI, equipping even those with limited technical expertise. Second, the paper will analyze the implications of choosing open-source software versus closed-source software and how such choices impact governance frameworks, transparency, and stakeholder trust (Schuett, 2023). Third, the importance of ethical governance practices will be assessed through critical evaluations of existing ethical guidelines and how they are integrated into operational frameworks (Greene et al., 2019). Finally, the study will explore how robust governance structures can foster an innovative environment, allowing these companies to adapt to technological advancements and market demands while ensuring their AI initiatives are aligned with broader business strategies (Ghani et al., 2022).

Methodology. *The research is in its seminal phase of development. The present working paper employs a qualitative approach to explore and analyze the governance structures of companies providing Generative AI solutions. The methodology consists of several key components.*

Regarding data collection, a representative sample of 10 companies specializing in generative AI was selected based on rigorous methodological criteria designed to ensure both homogeneity and comparability. The selection process incorporated several key principles:

- *Balanced geographical distribution: companies were chosen from the three main AI hubs-United States, European Union, and China-to capture the unique regulatory and market contexts inherent to each region.*
- *Dimensional homogeneity: to ensure that the comparison was not influenced by structural disparities between the subjects analyzed.*
- *Consistency of the operational scope: only entities with a core focus on developing and commercializing generative AI solutions were considered.*

The sample includes leading generative AI providers such as OpenAI, Anthropic, DeepMind, and emerging firms in the field. Companies are selected based on their market presence, the significance of their AI solutions, and their commitment to ethical practices. This includes both established firms and emerging companies to ensure a holistic view of the governance landscape. This approach allows for a diverse examination of governance structures across different organizational contexts, offering insights into various models and their implications for ethical AI development.

The primary data collected and analyzed consists of a variety of corporate documents. Initially, annual reports, merger and acquisition announcements, and press releases are examined. Annual reports provide insights into the governance structures, financial performance, and ethical commitments of AI companies. The analysis of merger and acquisition announcements aids in understanding how governance frameworks adapt to corporate strategies, specifically highlighting the expansion of the generative AI market. Finally, press releases and news articles assist in capturing public perceptions and the discourse surrounding governance practices.

Subsequently, the collected data undergoes thematic analysis to identify governance models, ethical practices, and choices between open-source and closed-source software. A comparative analysis will focus on the leading generative AI provider companies, such as OpenAI and Anthropic. This comparison will provide a deeper understanding of how various governance models influence ethical decision-making, risk management, and stakeholder engagement.

Results. *The analysis of the structured sample highlights how various factors influence a company's decision to modify its governance structure in order to ensure the ethical and safe development of AI models. The main dimensions that emerge are geographic location, company size, the corporate policy adopted, and the choice of AI model distribution (open-source or proprietary). Additionally, the rapid development of the AI market contributes to the continuous evolution of governance structures, which change in response to market dynamics.*

Geographic location is the first dimension. Identifying a single representative model, both in USA and EU, is not trivial. USA based companies, operating in a less restrictive regulatory environment, tend to adopt an autonomous approach, developing internal mechanisms to ensure the ethical and safe development of AI. In this context, self-regulation is encouraged by public debate and growing media attention on the issue. However, despite the trend among most American companies, companies like xAI do not place significant emphasis on security and ethical principles.

In contrast, European companies primarily rely on regulatory frameworks, hoping that ethical principles will be safeguarded through legislative interventions at the EU or national levels. However, their response is not uniform. European companies developing open-source models tend not to express significant concerns regarding the security and ethics of AI, considering the inherent transparency of their models sufficient to avoid changes to their internal governance. An example of this is the French start-up Mistral, which, operating with open-source systems, does not see the need to adopt specific mechanisms to address the transparency gaps typical of proprietary models. On the other hand, other European companies recognize the risks associated with AI development and are concerned about its implications, but do not always take concrete actions regarding Corporate Governance, suggesting a more cautious approach compared to their American counterparts.

Another factor to consider in this context is company size. European startups, for instance, appear less inclined to adjust their governance structures to ensure the ethical and safe development of AI, partly due to their limited resources. The lack of financial and organizational means could make it more challenging for these companies to implement advanced oversight and control mechanisms compared to larger firms in the sector. After all, the European Union (EU) follows a bank-based model, where corporate financing primarily depends on bank loans and credit. In contrast, the United States (USA) operates under a market-based model, where companies raise capital through financial markets, issuing stocks and bonds rather than relying on banks. While this system fosters liquidity, investment, and financial innovation, it also increases market volatility. Such differences in liquidity access may also influence the development and governance structures of generative AI companies. U.S. firms, relying on market funding, may prioritize aligning their governance structures with investor expectations to build trust and attract capital. Conversely, in the bank-based European model, financial stability is the primary concern, making governance adjustments to meet market expectations less urgent.

Another notable trend in the AI sector is the relationship between the choice of software model and the evolution of Corporate Governance. Specifically, many companies that adopt open-source software tend not to significantly modify their governance structure, whereas companies that develop proprietary software often implement structural changes in their governance. The underlying assumption that could explain this behaviour is that companies with proprietary models

are incentivized to adjust their governance to compensate for the benefits they miss out on by not adopting an open-source system. Open-source software not only provides greater product customization but also enhances stakeholder trust due to its increased transparency and accessibility (Hou and Jansen, 2022). As a result, companies developing proprietary models may feel the need to reinforce stakeholder trust by adapting their governance structures. A clear example of this dynamic is Mistral, which adopts an open-source model and has not implemented significant modifications in its governance model. Conversely, OpenAI, which develops proprietary software, has adjusted its governance structure to inspire greater stakeholder confidence, compensating for the lower transparency associated with its closed model.

For companies outside the U.S. and the EU, such as Chinese companies, governance structures are further complicated by political factors. In China, government control in strategic sectors like AI can strongly influence business decisions, raising doubts about the independence of these companies and the transparency of their decision-making processes. This scenery makes it difficult to determine whether governance changes are driven by the need to ensure security and ethics, or if they are the result of political and economic control imposed by the government.

Establishing a unified governance model and formulating universally applicable principles is challenging, not only due to the diversity of approaches but also because of the constant evolution of the market, which drives companies like OpenAI to modify their governance structures. Initially founded as a non-profit organization, it underwent a radical transformation following Microsoft's partial acquisition, shifting towards a more profit-oriented model. This change illustrates how market dynamics and internal developments can shape governance decisions and how companies adapt to new circumstances to balance innovation, financial sustainability, and strategic objectives.

In conclusion, the governance structures of companies operating in the field of Generative AI are shaped by a complex interaction of geographic factors, company size, internal policies, and the choice between open-source or proprietary models. These factors determine varied approaches to managing the ethical and security challenges of AI, and corporate responses can differ significantly depending on the context in which they operate.

Research limitations. *The study presents several limitations that deserve to be carefully considered. First, the non-quantitative methodological approach that has been adopted in the research could constitute a major obstacle in the ability to derive conclusions that are statistically generalizable to the entire sector. This type of approach, while offering valuable qualitative insights, does not allow for establishing robust statistical correlations or determining the prevalence of specific phenomena with numerical precision.*

Second, the sample that has been analyzed presents evident limits in terms of overall representativeness, as the investigation focuses exclusively on generative AI providers, excluding other relevant actors in the sector. Moreover, the relatively limited number of companies included in the study further reduces the possibility of capturing the full range of variations in governance structures present in the field.

To significantly improve the scientific validity and representativeness of the obtained results, future research in this field should consider a substantial expansion of the examined sample, including companies operating in different segments of the artificial intelligence ecosystem, beyond providers of generative solutions. This broader and more inclusive perspective would allow for a remarkably more complete and multi-faceted analysis of existing governance structures across the entire artificial intelligence sector. Consequently, this more comprehensive approach would lead to the development of results characterized by greater scientific solidity and a higher degree of generalizability, thus offering a deeper and more reliable understanding of the studied phenomenon.

Managerial implications. *The findings of this research will have important implications for policymakers, platform owners, and entrepreneurs. By understanding the interplay of various factors, organizations can strategically align their governance practices with ethical standards and stakeholder expectations. The following examines the main managerial implications: i) governance structures should be revised to prioritize trust-building within the organization and with external stakeholders. This is particularly vital for companies using proprietary models, as they may face skepticism regarding transparency and ethical considerations. Implementing robust oversight functions can help mitigate these concerns while reinforcing stakeholder trust. Research supports that incorporating trust into AI governance frameworks can lead to more successful implementations. (Frey et al., 2018); ii) organizations must adapt their governance structures based on their geographic location and corresponding regulatory environments. For example, U.S.-based companies might implement self-regulatory mechanisms, while European firms may need to align their policies with EU regulations. These regional differences highlight the necessity for adaptable governance frameworks that can respond to local contexts and legal requirements (Khlystova et al., 2022); iii) corporate governance should integrate ethical considerations that address stakeholder concerns over AI development. Establishing ethical review boards or committees to monitor AI projects and ensure alignment with ethical standards is crucial. Anticipated regulatory frameworks, such as the EU's proposed AI Act, can serve as a guide for businesses in defining these ethical requirements (European Commission, 2021); iv) differences between bank-based capital markets (e.g., the U.S.) and market-based systems (e.g., the EU) necessitate distinct governance strategies. U.S. firms may benefit from a focus on innovation and risk management, while European companies should emphasize stakeholder engagement and social responsibility. Understanding these differences is essential for aligning governance practices with both financial objectives and ethical responsibilities (IMD, 2024); v) companies that adopt open-source models often benefit from greater transparency and collaborative innovation, which can strengthen governance practices. Such companies may not feel the need for extensive governance modifications. Conversely, those developing proprietary models must enhance governance structures to build stakeholder trust and compensate for perceived opacity; vi) company size significantly influences its ability to adjust*

governance structures. Smaller startups may lack the resources necessary to implement comprehensive governance frameworks, which could affect their ability to ensure ethical AI development while larger firms should lead by example, establishing best practices that smaller companies can emulate; vii) finally, our research suggests that an effective AI governance framework should not only ensure compliance and ethical integrity but also foster innovation and entrepreneurship. Platform owners need to implement robust governance mechanisms that promote both regulatory alignment and technological advancement. Transparent policies and collaborative ecosystems can enhance accountability while supporting dynamic business models. For entrepreneurs, understanding the evolving regulatory landscape is critical for mitigating compliance risks and effectively advocating for their interests. Collective action and industry networks can provide valuable support in navigating governance challenges and fostering responsible AI innovation. Moreover, governance structures should reinforce the social pillar of ESG by aligning AI development with broader societal and environmental goals. Initiatives that integrate AI with community engagement and social welfare programs can enhance stakeholder trust and demonstrate corporate commitment to responsible innovation.

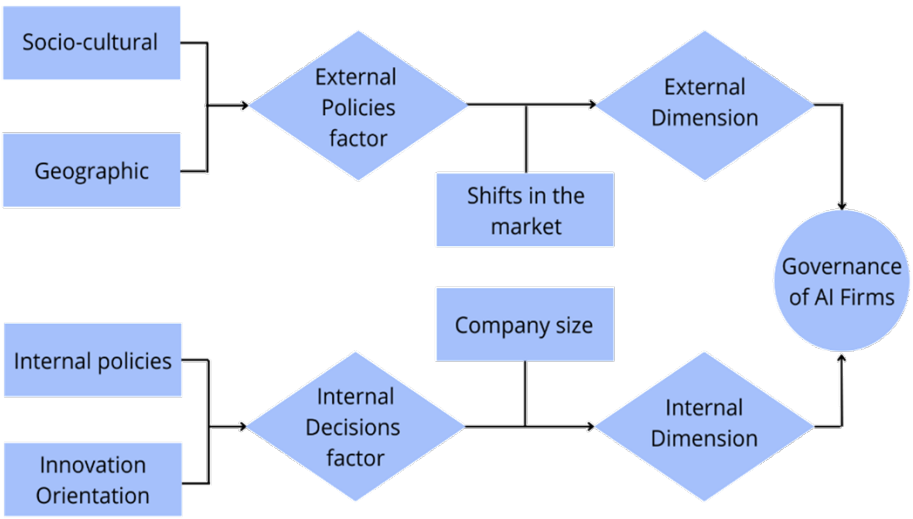
Originality of the paper. *The originality of this paper lies in several innovative elements introduced throughout the study. First, it examines the governance structures of AI companies, a topic still relatively unexplored by the literature, also due to the rapid evolution of AI landscape. In the same vein, while the study's narrow focus on generative AI providers may be seen as a limitation, it also represents a novel contribution by delving into a field that is still underdeveloped and rarely addressed in academic discourse.*

Furthermore, as depicted in Figure 1, we introduced a tripartite analytical framework to critically analyze AI's impact on governance. This conceptual model provides a structured approach to understanding the complex interplay between AI and corporate governance, further enriching the academic discussion on the subject.

Finally, we introduce Figure 2 as an additional originality feature of the present study. The upper block, consisting of the geographical and socio-cultural dimensions, represents the key factors influencing policymakers' decisions. Political choices, combined with market changes, constitute the external dimensions that impact the governance strategies adopted by AI companies.

The second block, on the other hand, focuses on internal decisions. The choice of software model (open-source or proprietary), along with the business strategy - oriented towards value creation or profit maximization - represent the main internal decision-making factors. These, in turn, combined with the company dimension, contribute to defining the internal variables that influence the structural governance choices of AI firms. This flow representation, organized into blocks, synthesizes the dynamics that determine the governance choices of a company operating in the Artificial Intelligence sector, highlighting the interaction between external and internal factors in shaping governance structures.

Fig. 2: The Multidimensionality of Decision-Making Processes in the Governance of AI Firms.



Source: Authors' elaboration

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Il Web3 incontra l'AI. Verso nuovi modelli di business decentralizzati e generativi

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Abstract

Lo studio presenta i primi risultati relativi all'analisi dell'impatto dell'IA nel modello piattaforma del Web3, abilitata dalle distributed ledger technologies (DLT). Il lavoro adotta un approccio qualitativo multilivello all'indagine, mediante il ricorso al metodo adduttivo applicato a dati raccolti attraverso il coinvolgimento di oltre 100 manager ed esperti nella gestione di progetti con tecnologia blockchain. Dal lavoro emerge che l'IA riveste un ruolo chiave nei modelli piattaforma Web3, nelle dimensioni rilevanti dei modelli di business piattaforma: creazione del valore, delivery del valore e cattura del valore. In particolare, i primi risultati mostrano come l'IA migliora l'efficienza operativa, la governance strategica e i processi decisionali nelle piattaforme decentralizzate Inoltre, l'IA consente di personalizzare, ottimizzare i processi di matching e le interazioni all'interno delle piattaforme del Web3. Viene evidenziato il ruolo dell'IA nel promuovere, i processi di knowledge transfer, l'innovazione e la formazione delle risorse umane, potenziando la possibilità di attingere a figure qualificate per gestire il complesso ecosistema Web3. Lo studio mostra come l'IA migliori le prestazioni delle piattaforme basate sulle DLT accrescendo la conoscenza rispetto al funzionamento dei modelli piattaforma decentralizzati e offrendo rilevanti implicazioni manageriali e di policy per fare leva sulle peculiarità dell'IA per massimizzare il valore dei modelli di business piattaforma.

Keywords. *Intelligenza Artificiale, Generative AI, Distributed Ledger Technologie, Web3, blockchain, business model innovation, Web3*

Introduzione. *Con l'evoluzione delle tecnologie digitali il modello piattaforma si sta affermando come business model prevalente rispetto ai modelli tradizionali (Rohn et al., 2021; Täuscher and Laudien, 2018), consentendo alle organizzazioni di creare e catturare valore facendo leva sugli effetti di rete e le interazioni digitali (Mcintyre and Srinivasan, 2017). Le piattaforme rappresentano interfacce che facilitano lo scambio tra una rete di utenti che agiscono come acquirenti e venditori (Mcintyre e Srinivasan, 2017). L'avvento del Web3, riconfigura il modello piattaforma (Lage et al., 2022; Trabucchi et al., 2020). Il mercato del Web3 raggiungerà i 22,57 miliardi di dollari entro il 2029 a un tasso di crescita annuo del 38,4% (The Business Research Company, 2025). Centrale nell'evoluzione dei modelli piattaforma Web3 è la tecnologia blockchain, definita come un database distribuito basato sulla crittografia e governato da meccanismi di consenso (Beck et al., 2017). Le caratteristiche della blockchain implicano un cambiamento di paradigma nei modelli piattaforma, perché decentralizzano la governance, migliorando la trasparenza ed eliminando gli intermediari (Trabucchi et al., 2020). Studi manageriali hanno evidenziato infatti come le piattaforme basate su blockchain siano caratterizzate da maggiore apertura e trasparenza delle transazioni rispetto alle piattaforme tradizionali, e dalla disintermediazione, che consente un maggiore controllo sui dati ed una accresciuta simmetria delle informazioni, che accresce a sua volta la fiducia dei partecipanti al network (Schmück et al., 2025). Tuttavia, nell'ambito dei nuovi paradigmi delle piattaforme abilitate da blockchain, sono ancora ridotti gli studi relativi all'impatto potenziale di altre tecnologie emergente, come l'intelligenza artificiale (AI). I recenti sviluppi dell'IA offrono infatti nuove opportunità di creazione di valore per le imprese (Patrucco et al., 2024). L'IA si dimostra capace di innovare i Modelli di Business (BM) tradizionali, automatizzando i processi, influendo sui processi decisionali, e migliorano le capacità predittive delle imprese (Burström et al., 2021). Le peculiarità dell'IA ne suggeriscono il potenziale nell'innovare i modelli piattaforma, anche quelli basati su blockchain, tuttavia si tratta di aspetti che non sono stati ancora esplorati*

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nella letteratura manageriale. Infatti, nonostante si riconosca la capacità sia dell'IA che della blockchain di innovare i BM (Ghosh, 2025; Paiola et al., 2024), tuttavia mancano studi che esplorino il loro effetto integrato sui BM piattaforma (Brewer et al., 2024). Si tratta di aspetti rilevanti alla luce della convergenza delle due tecnologie nelle piattaforme Web3, e che crea nuove opportunità e sfide per le organizzazioni che cercano di adattare i loro BM a un'economia sempre più digitalizzata (Lage et al., 2022; Trabucchi et al., 2020). Il presente studio ha l'obiettivo di colmare questo gap, accogliendo una prospettiva manageriale all'analisi degli impatti dell'IA sulle piattaforme basate su blockchain, per indagare come l'integrazione dell'IA influenzi i BM piattaforma abilitata con blockchain nelle dimensioni chiave di creazione di valore, value delivery e cattura di valore (Osterwalder et al., 2005; Rohn et al., 2021).

I modelli piattaforma abilitati da blockchain. *A differenza dei BM tradizionali il modello piattaforma presenta meccanismi peculiari di creazione di valore che dipendono dalla centralità del network (Rohn et al., 2021). La letteratura sottolinea infatti come nel modello piattaforma la struttura peculiare della rete influisce sui meccanismi di creazione del valore, influenzando le attività chiave - che si basano sull'incontro tra acquirenti e venditori- la proposta di valore - legata alla capacità dei partecipanti di accedere a una più ampia varietà di prodotti offerti dalla rete- e alle caratteristiche della piattaforma (Afhuan, 2013; Mcintyre and Srinivasan, 2017) Rispetto ai modelli piattaforma tradizionali, le piattaforme abilitate da tecnologia blockchain presentano caratteristiche peculiari: le esternalità di rete sono basate sulla decentralizzazione (Trabucchi et al., 2020); ciò significa che le transazioni tra gli utenti non dipendono da un entità centrale che ne regola lo svolgimento, in tal modo consentendo a ciascun partecipante di beneficiare pienamente degli effetti di rete (Murray et al., 2023). Inoltre, il potere assegnato agli utenti, attraverso la tokenizzazione e la capacità di catturare direttamente il valore generato, accresce la partecipazione nella piattaforma, potenziando le esternalità di rete (Trabucchi et al., 2020). Peraltro, le risorse chiave che caratterizzano il modello piattaforma blockchain derivano dalle caratteristiche peculiari delle digital ledger technologies, ed includono la trasparenza delle transazioni, l'esecuzione automatica in conseguenza del verificarsi di una determinata condizione, le verifica delle transazioni da parte di tutti i nodi con un contenimento dei costi delle transazioni, e ridotto rischio di alternazione dei dati. Poiché le transazioni sono accessibili a tutti i membri della rete, questo aumenta la simmetria delle informazioni nella rete (Schmück et al., 2025). Inoltre, le piattaforme blockchain consentono la tokenizzazione dei dati, permettendo lo scambio di oggetti fisici digitalizzati anche attraverso le criptovalute (Schmück et al., 2025). Il modello piattaforma abilitata con blockchain aumenta inoltre il controllo degli utenti sulle loro attività e sui loro dati (Lage et al., 2022; Trabucchi et al., 2020), offrendo anche la possibilità ai partecipanti di ricevere un compenso diretto per il valore creato attraverso le attività creative (Murray et al., 2023). Infine, attraverso la tokenizzazione, il modello di piattaforma blockchain consente di accrescere il valore della condivisione (Schmück et al., 2025; Trabucchi et al., 2020), che viene riconosciuta come un'esternalità di rete rilevante nei modelli piattaforma (Murray et al., 2023; Trabucchi et al., 2020*

Modelli piattaforma e Intelligenza Artificiale. *L'IA è stata definita da McCarthy (2007) come "la scienza e l'ingegneria della creazione di macchine intelligenti, in particolare di programmi informatici intelligenti" (McCarthy; J., 2007). La caratteristica principale dell'IA è quella di imitare l'intelligenza umana, accrescendo le capacità predittive e di soluzione problemi complessi attraverso la leva dei dati (Heimberger et al., 2024). Oltre l'automazione dei processi, l'IA agisce come tecnologia capace accelerare i processi di innovazione e di creazione del valore (Burström et al., 2021; Mishra and Tripathi, 2021; Teece, 2018), aumentando la capacità creativa e progettuale delle imprese (Davenport and Mittal, 2022) che consente di attivare processi dinamici di innovazione continua nelle organizzazioni (Jorzik et al., 2024; Mithas et al., 2022).*

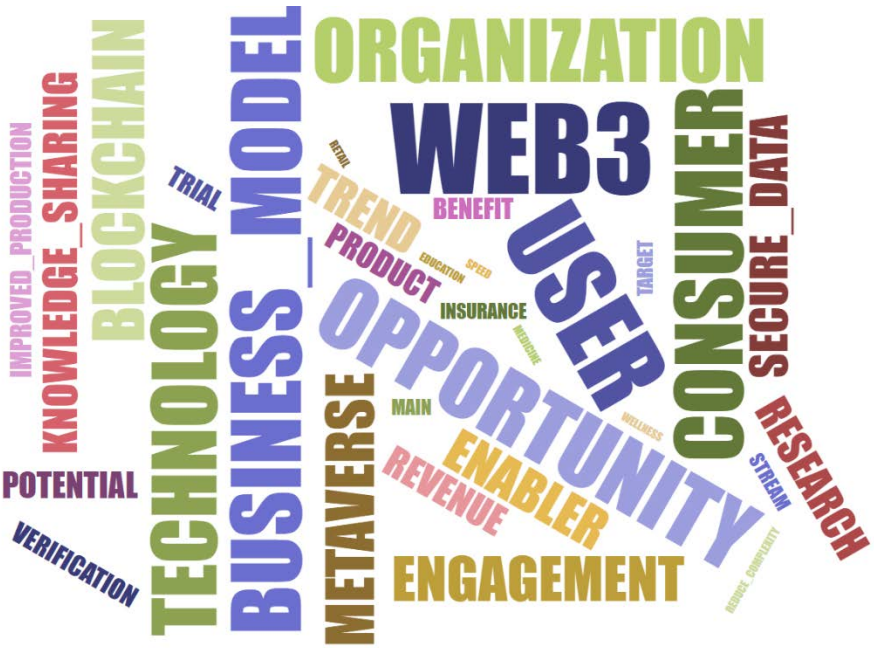
L'IA è anche considerata come abilitatore della trasformazione dei BM tradizionali verso modelli piattaforma, in quanto favorisce l'intelligenza dei dati e l'interoperabilità, e migliora le capacità delle altre tecnologie (Mishra and Tripathi, 2021).

Nell'ambito dell'integrazione dell'IA nei BM abilitati alla blockchain, studi recenti hanno suggerito la complementarità delle due tecnologie: l'IA può infatti migliorare l'efficacia dei sistemi blockchain facilitando la prevenzione dei fallimenti sistemici che rappresentano uno dei maggiori rischi dei modelli blockchain (Brewer et al., 2024). Nonostante la rilevanza dei processi di interazione tra blockchain e AI, mancano studi che sistematizzino il ruolo dell'IA nell'ambito dei modelli piattaforma basati sulle DLT, come blockchain ed in particolare nell'ambito del Web3.

Metodologia d'indagine. *Per raggiungere gli obiettivi di ricerca, lo studio ha previsto l'impiego di un approccio mixed - method multilivello basato sulla somministrazione di un questionario articolato su domande chiuse ed aperte a top manager appartenenti a diversi settori. Lo studio è stato integrato con lo svolgimento di un focus group che ha coinvolto un panel di manager attivi in progetti nel Web3.Le risposte aperte al questionario sono state sottoposte ad analisi testuale mediante il software T-LAB, al fine di identificare le relazioni tra le principali parole chiave (Lemmi) nel corpus e approfondire significato del punto di vista dei manager circa il ruolo dell'IA nel Web3. Le unità lessicali chiave sono state poi sottoposte ad analisi secondo il modello dell'ego-network, con un focus alle parole "blockchain" e "Intelligenza Artificiale" con le sue variazioni lessicali (Machine Learning e Generative AI). I risultati sono stati successivamente sottoposti ad un processo di generazione teorica mediante il ricorso all'approccio adduttivo, mutuato dalla grounded theory (Glaser and Strauss, 1967) secondo una prospettiva interpretativista (Charmaz, 2001) al fine di generare nuove ipotesi esplicative e apportare innovazioni teoriche a un corpus di conoscenze esistente (Timmermans and Tavory, 2012; Vila-Henninger et al., 2022) rispetto al ruolo dell'IA nel business model piattaforma abilitata da blockchain.*

Primi risultati. *Il work cloud che è stato realizzato attraverso l'elaborazione delle risposte aperte al questionario con il software TLab offre una prima panoramica delle principali parole chiave presenti nel discorso dei manager*

Fig. 1: Word cloud delle parole dominanti il discorso degli intervistati

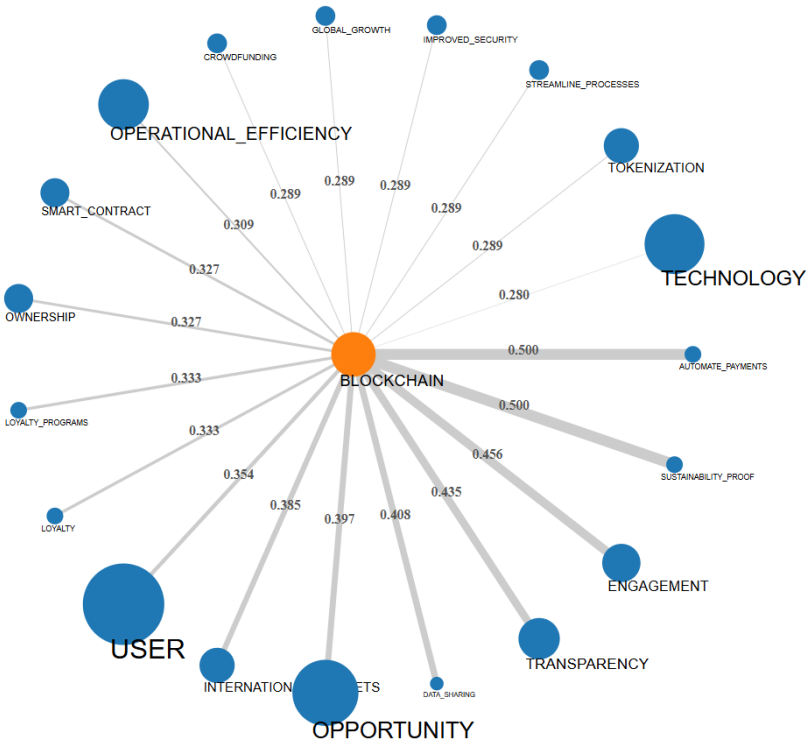


Fonte: elaborazione propria attraverso software T-Lab

Le parole chiave enfatizzano gli aspetti di valore del modello di piattaforma basata su blockchain, in particolare la gestione dei dati, la decentralizzazione ("piattaforma decentralizzata") e l'automazione ("automazione dei processi"). Inoltre, le keyword: "sperimentazione", "efficienza operativa", "automazione dei processi" sottolineano le potenzialità del Web3 nell'innovare il BM. La presenza di parole chiave come "modello di business", "intelligenza artificiale" e "Web3" indicano il focus degli intervistati sull'interazione tra tecnologie del Web3 e l'IA nell'innovare il BM del Web3.

Ego network e associazioni di parole. Le prime analisi delle relazioni tra concetti chiave nel discorso dei manager, attraverso il software T-Lab, rispetto ai lemmi chiave legati a blockchain a "Intelligenza Artificiale" (parola al centro dell'ego. Network) rafforzano la rilevanza di alcune delle peculiarità che caratterizzano le formule di articolazione del valore dei modelli *piattaforma decentralizzati, tra cui l'automazione delle transazioni, ("smart contract"; "automatizzare i pagamenti") e la trasparenza delle transazioni ("trasparenza"). Nell'ambito della value proposition, sono rilevanti anche i concetti di "ownership" e "tokenization", oltre che di "engagement" e "loyalty program" da cui si inferisce il ruolo della blockchain nella costruzione di value proposition basate sulla proprietà di asset digitali e sulla condivisione, capaci di rafforzare gli effetti di rete. Un ulteriore aspetto è la riduzione degli intermediari e l'estensione dello scope della piattaforma, attraverso l'accrescimento del target e della global reach, che può essere inferita dai termini "crescita globale" e "mercato internazionale".*

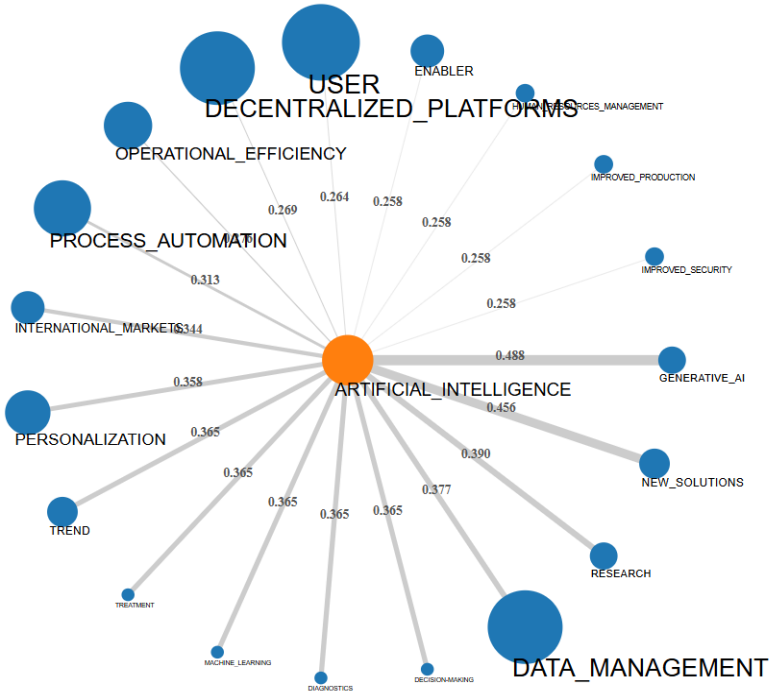
Fig. 2: Ego Network per le parola chiave "Blockchain", I valori indicano l'intensità dell'associazione della keyword centrale con la keyword nel radiale dove 0= associazione minima e 1 = associazione massima



Fonte: elaborazione propria attraverso software T-Lab

L'analisi rivela anche che l'IA facilita la connessione tra i partecipanti ('connect') accrescendo il valore che viene generato nelle piattaforme e creando nuovi servizi ("new solutions") in tal mondo accelerando l'acquisizione di capacità dinamiche di gestione delle risorse delle piattaforme del Web3.

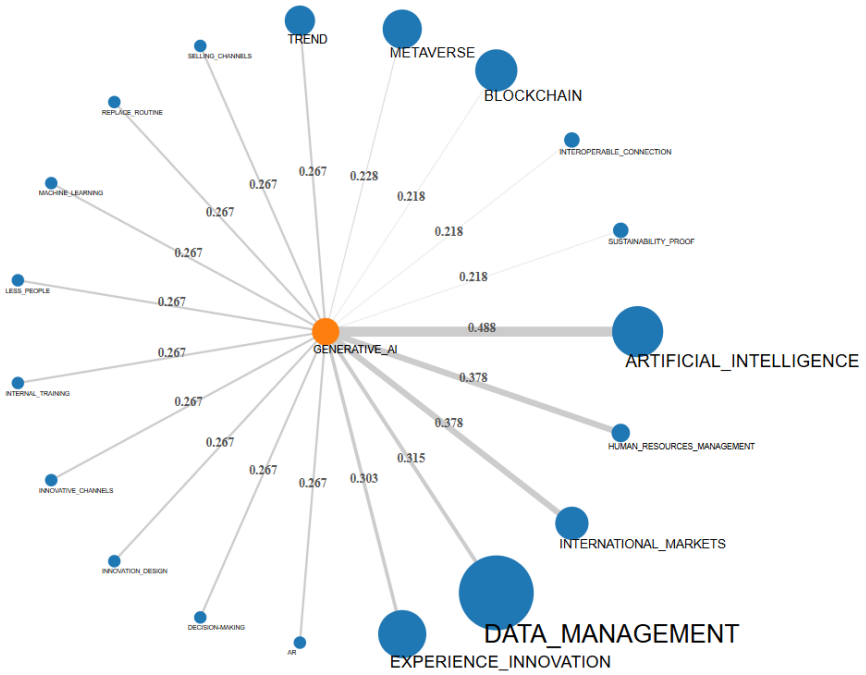
Fig. 3: *Ego Network per la parola chiave "Intelligenza artificiale", I valori indicano l'intensità dell'associazione della keyword centrale con la keyword nel radiale dove 0= associazione minima e 1 = associazione massima*



Fonte: elaborazione propria attraverso software T-Lab

Inoltre, le parole chiave "data management" e "efficienza operativa", suggeriscono che l'IA agisce migliorando i meccanismi che regolano gli scambi mediante una gestione ottimale del dato. Un altro concetto rilevante è "esperienza" che, collegato al lemma "IA generativa" e "Machine Learning", e ai termini legati a innovazione, suggerisce la capacità dei modelli generativi di migliorare l'esperienza dell'utente nelle piattaforme decentralizzate. Il miglioramento dell'esperienza è legato anche al concetto di "personalizzazione", che suggerisce che l'IA può aggiungere nuovo valore ai modelli delle piattaforme abilitate alla blockchain, migliorando la capacità offrire agli utenti esperienze personalizzate.

Fig. 4: Ego Network per la parola chiave "Generative AI", I valori indicano l'intensità dell'associazione della keyword centrale con la keyword nel radiale dove 0= associazione minima e 1 = associazione massima



Fonte: elaborazione propria attraverso software T-Lab

Un ulteriore aspetto riguarda le risorse chiave. Infatti, le parole chiave "gestione delle risorse umane", "formazione interna" e "processo decisionale", associate al lemma "Intelligenza artificiale", suggeriscono che l'IA facilita la generazione di nuove competenze e l'accrescimento delle capacità di presa delle decisioni. Rilevante è anche il concetto "miglioramento della sicurezza", che insieme a "efficienza operativa" e '"automazione" consente di inferire che l'IA aumenta l'efficienza del matching nelle piattaforme web, sia in termini di velocità che di efficienza delle transazioni. Questo aspetto rafforza potenzialmente i meccanismi di governance decentralizzata delle piattaforme abilitate dalla blockchain, soprattutto nell'ambito della value delivery.

Discussioni e Conclusioni. *Il lavoro investiga le sinergie tra AI e blockchain nel contesto delle piattaforme, secondo la prospettiva dei manager che operano in diversi settori e coinvolti in progetti di implementazione di queste nuove tecnologie. Applicando un approccio adduttivo all'indagine, il lavoro fa emergere risultati rilevanti rispetto all'impatto dell'IA nei modelli piattaforma abilitate da blockchain. L'IA migliora il funzionamento dei sistemi Web3, potenziando i driver che caratterizzano i modelli piattaforma blockchain-based e che sono già stati evidenziati nella letteratura esistente (ad esempio Schmück et al., 2025). Nell'ambito delle attività di creazione di valore, l'analisi fa emergere la centralità dell'IA come abilitatore di connessione e di interoperabilità. Infatti l'IA, attraverso la leva dei dati consente di collegare più piattaforme abilitate dalla blockchain, ampliando le possibilità di matching tra diversi standard di blockchain, massimizzando in tal modo il potenziale delle informazioni accessibili sulla piattaforma, con un potenziamento degli effetti di rete. I risultati mostrano che da un lato blockchain facilita l'interazione diretta tra parti commerciali e il rispetto dei contratti, eliminando al contempo gli intermediari, dall'altro l'IA apporta alla piattaforma efficienza operativa, ottimizzando il flusso delle interazioni tra le parti. Inoltre l'IA può abilitare nei modelli piattaforma decentralizzati "nuove soluzioni" o "soluzioni migliorate" che consentano condizioni di scambio ottimizzate e soprattutto più sicure. Rispetto alle "risorse chiave" i risultati rivelano inoltre che l'IA, accresce le connessioni ottimizzando il matching e lo scope delle imprese, e modellando nuove strategie sulla tokenizzazione del valore generato, massimizzando la reach della piattaforma decentralizzata. Inoltre, l'IA può supportare i processi di decisione strategica delle piattaforme, accrescendo la capacità di ricorrere ai dati per formulare previsioni, ed ottimizzare le scelte strategiche. Un ulteriore aspetto riguarda la gestione delle risorse umane, ed in particolare dei creativi e degli sviluppatori. Le piattaforme open-source basate su blockchain consentono infatti agli sviluppatori di innovare*

liberamente, contribuendo al miglioramento delle piattaforme. In questo l'IA svolge un ruolo cruciale, in quanto i manager ne sottolineano l'importanza nella "gestione delle risorse umane" e nella "formazione interna", verso lo sviluppo di comunità di talenti altamente qualificate all'interno dell'ecosistema Web3. Infine nella dimensione del value delivery, l'IA svolge un ruolo cruciale nella automazione e ottimizzazione dei processi che regolano la "value proposition", agendo direttamente nella gestione dei "consumatori" e dei "canali di vendita". Infatti, l'IA accresce le capacità di uso dei dati storici degli utenti e le transazioni sulla blockchain per mappare la clientela e creare automaticamente offerte personalizzate in base al comportamento e alle preferenze dei clienti. Le analisi evidenziano anche come l'IA possa fornire "canali innovativi", costruiti su misura per il cliente. Nella dimensione della cattura del valore, e in particolare nell'ambito dei meccanismi di prezzo, se la blockchain garantisce la certezza delle transazioni, l'IA può consentire l'implementazione di strategie di prezzo basate sulle caratteristiche del cliente. Il lavoro fa emergere che l'IA e la blockchain, nell'ambito dei modelli piattaforma del Web3, possono creare non solo complementarietà tecnologica ma anche complementarietà di innovazione, aumentando la produttività e il valore generato. Tale sinergia rappresenta un aspetto rilevante per le imprese per mantenere un vantaggio competitivo duraturo in contesti di mercato caratterizzati da elevata complessità. Si tratta di un aspetto importante anche nell'ottica della diffusione del modello piattaforma (Trabucchi et al., 2023), infatti l'IA e la sua interconnessione con la blockchain potrebbe rappresentare una leva importante di accrescimento della competitività dei modelli piattaforma. Tuttavia, l'orchestrazione delle interconnessioni tra AI e blockchain loro orchestrazione richiede una visione chiara e una pianificazione strategica da parte dei manager, affinchè i benefici derivanti dall'interazione tra le due tecnologie possano essere sfruttati appieno, limitandone i possibili rischi, e che sono legati principalmente alla natura delle infrastrutture ed alla governance dei dati.

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The Future of Education: reframing skills and learning in the age of artificial intelligence

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Abstract

The introduction of artificial intelligence (AI) into education is fundamentally transforming learning models, skill requirements, and labor market dynamics. This study explores how AI adoption is reshaping education, focusing on the skills needed to address AI-driven changes. Through interviews with CEOs and educational experts, the research highlights the challenges and opportunities in both educational and professional contexts, emphasizing the importance of balancing hard and soft skills and promoting continuous learning. Using co-occurrence analysis with T-Lab software, the study uncovers how AI is altering learning models, data management, professional training, and cross-sector partnerships. The findings provide practical insights for educational institutions and businesses to better align curricula and learning approaches with emerging market demands, thereby supporting the workforce's adaptive capacities.

Introduction and background. *In an increasingly digitalized world, technology has moved beyond being merely a support tool or enhancer, becoming an infrastructural layer that permeates society and profoundly influences both the labor market and education. Digital technologies have established themselves as enabling factors across various sectors, including education, leading to a growing reliance on their applications by both users and institutions (Rahmatullah et al., 2022). Today, with digital technologies integrated into living spaces, students are digital natives and have grown accustomed to engaging with active and interactive learning methods, which they find more effective than traditional, passive approaches (Kozanitis & Nenciovici, 2023). On the other hand, the workforce is increasingly composed of an aging population, which necessitates ongoing training and the development of new educational models that cater to the need for lifelong learning. These combined pressures have led to a shift in the role of technology in education, making it not just an optional enhancement but a critical element for addressing the diverse needs and expectations of both younger and older generations in today's workforce (Hashim, 2018).*

In this evolving landscape, artificial intelligence has emerged as a key driver of transformation, with recent technological advancements and the growing proliferation of AI pushing the discussion beyond theoretical speculation toward empirical research focused on its tangible impact on learning processes and teaching methodologies (Kaplan & Haenlein, 2019; Labadze et al., 2023). This shift is already visible in concrete applications that are reshaping learning models and the overall educational experience, making it more adaptive, interactive, and tailored to students' needs.

According to a recent Microsoft report (2024), in school settings, 95% of institutional leaders, 68% of educators, and 62% of students report engaging with AI-powered tools in some capacity, highlighting the growing integration of these technologies into everyday teaching and learning practices. Institutional leaders primarily leverage AI to enhance the efficiency of operational and administrative processes (37%) and to improve equitable access to educational knowledge and resources (34%) (source). Educators integrate AI into their lesson planning workflows and the management of supporting materials and assignments (24%), while also utilizing it to simplify complex topics for students (20%). Meanwhile, students report using AI for summarizing information (35%) and for brainstorming and generating initial ideas for assignments (32%).

These trends show how AI is being seamlessly incorporated at multiple levels of the educational ecosystem: rather than serving as a mere tool for automation, AI functions as a support mechanism that augments human capabilities, streamlining routine tasks while enabling educators and students to focus on more cognitively demanding and creative aspects of learning and teaching.

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Research shows that a key application of AI in education is the use of chatbots, which engage students in dynamic interactions, fostering sustained dialogue and enhancing engagement with the subject matter (Perez et al., 2020). Likewise, expert systems are increasingly employed for pedagogical planning, supporting educators in the development of more efficient and personalized curricula (Huang et al., 2021). AI also plays a critical role in shaping the relational dimensions of education-for instance, Learning Management Systems (LMS) optimize interactions between students and instructors, facilitating a more collaborative and continuous learning experience (Dias et al., 2015). More broadly, AI-driven predictive models enable proactive and adaptive learning strategies, fostering a more equitable educational framework by dynamically adjusting to individual learning needs and cognitive styles.

At the same time, AI is reshaping how educational institutions approach learning and management. It goes beyond automating tasks and streamlining processes, driving a fundamental change in how people learn, collaborate, and make decisions. Through AI integration, organizations are not just improving existing methods but are fundamentally transforming how knowledge is created, shared, and applied. For instance, AI enhances organizational learning by facilitating iterative co-creation, where knowledge is continuously assimilated and reused (Massa et al., 2023). Building on Simon's (1991) concept of bounded rationality, AI helps overcome human limitations in decision-making, offering predictive models and decision-support tools. One of AI's most powerful contributions is to experiential learning, where individuals engage with smart tools, access new information, and receive immediate feedback, all while learning through simulation and modeling. This approach fosters proactive learning by allowing students to explore different solutions in virtual scenarios before applying them in the real world. AI also nurtures incremental learning, enhancing processes and improving efficiency over time by providing real-time feedback and allowing continuous refinement of skills and knowledge.

The impact of AI influences not only educational frameworks (Xue et al., 2022) but also leads to a shift in the skills required by employers and, consequently, in those that educational institutions must develop to address this mismatch (An et al., 2024).

In the context of AI, the balance between hard and soft skills is particularly significant. While effective use of AI requires hard skills such as data analysis, prompt engineering, and overall data literacy, soft skills play an equally critical role. Competencies such as curiosity, problem-solving, lateral thinking, and adaptability enable individuals to respond to market changes and adopt a continuous learning approach (Pustalova & Vahter, 2025). Useful in this regard is the concept of complementarity between human and artificial intelligences, based on the idea that, although artificial intelligence (AI) can take on specific tasks with efficiency and precision, human qualities such as creativity, empathy, and critical thinking remain indispensable in many contexts. With this in mind, a vision of learning models is developing in which AI does not merely replace human work but enhances it by promoting synergistic collaboration between humans and machines (Brynjolfsson & McAfee, 2017).

The adoption of AI in education presents challenges, particularly the risk of reducing critical and creative thinking. Ethical concerns, such as data protection, require clear regulatory frameworks and ethical guidelines. A "Human by Design" approach is essential, ensuring individuals remain central to technological development. Educational institutions, especially universities, must guide innovation and support the transition to hybrid roles involving AI. AI integration should also involve humanities subjects to foster a critical approach, addressing both technological and ethical issues, ensuring equitable access to learning, and maintaining academic integrity.

Purpose of the paper. *Despite the growing body of literature on AI in education, there is limited empirical research on how educational institutions and businesses perceive the changing skill requirements. This study addresses this gap by comparing insights from CEOs and education experts on the evolving interplay between AI, skills development, and professional training. In light of these transformations, it is essential to understand how education is evolving to meet the skill needs that arise from the rapid integration of disruptive technologies in business.*

Hence, our research, currently in progress, aims to deepen the understanding of how artificial intelligence is reshaping the skills required by the labor market and how educational institutions, businesses, and governments are responding to these needs in the world of work.

Methodology. *The research is based on 19 in-depth interviews conducted between October 2024 and March 2025 with 15 CEOs and Presidents from Italian companies across sectors such as IT, consultancy, fashion, finance, shipbuilding, steel, and aviation, alongside 4 education experts. The sample, selected through a key informant approach (Robson & Foster, 1989), included both public and private organizations and aimed to capture strategic perspectives on the intersection between AI, education, and work transformation. Interviews followed a loosely structured protocol exploring AI's impact at macro (society and economy), meso (organizational models), and micro (skills and learning needs) levels. Each conversation lasted about an hour and was recorded, transcribed with AI tools, and anonymized. Data analysis combined text mining with qualitative interpretation. Using T-LAB software (Lancia, 2012), we examined keyword frequencies and co-occurrences, producing ego networks and word clouds to highlight emerging themes. This was integrated with cognitive mapping (Eden, 2004), which traced cause-effect links among concepts in each interview, later merged into a collective map of shared perceptions, visualized via Mural*

Results. *The following section presents the findings of our study, structured to first illustrate the perspectives of the two panels: Education Experts and CEOs. This division allows for a clearer understanding of how AI is perceived in terms of its impact on skills development and education from both a corporate and an academic standpoint.*

After presenting these viewpoints separately, the analysis highlights areas of convergence and divergence between the two groups. This comparative approach helps to identify common ground in addressing the challenges posed by AI, as well as the differing priorities and concerns that emerge within each professional domain.

a) Education Panel

The interviews reveal a strong focus on developing the skills necessary to face the challenges of AI in the labor market. In particular, the keyword analysis suggests the extent of change resulting from AI integration in education, affecting both higher and continuing education as well as labor market dynamics.

The most recurrent terms include "artificial intelligence", alongside "individual", "skills" (including "soft skills"), "university", "young people", "work", and "training paths." This highlights the central role of AI as a technological phenomenon with a profound impact on competencies, the pivotal function of universities, and the future of educational pathways in relation to ongoing technological advancements.

Additionally, the prominence of terms such as "learning processes" and "proper use" underlines the interviewees' focus on how AI is integrated into educational programs. This suggests that experts are not only concerned with the methodological aspects of AI-driven learning but also with the ethical implications of using AI in education.

The topic of skills also emerges as highly relevant. A strong emphasis is placed on the development of soft skills, particularly analytical thinking in relation to AI (comprehension skills). This suggests that, beyond technical knowledge, interviewees consider transversal skills to be crucial, necessitating the development of new hybrid approaches to skills training in the context of AI.

At the same time, the high recurrence of terms such as "enterprise", "European alliances", and "university" highlights the importance of adopting a shared vision and fostering cooperative approaches among various stakeholders. These collaborations are not limited to academia but also involve the corporate sector. Accordingly, priority is given to creating collaborative models between universities and businesses that transcend national boundaries. This aims to address the challenges related to designing learning models in the new scenarios shaped by AI adoption in educational contexts, following open and multilateral approaches.

Furthermore, the network analysis enabled the classification of interview narratives into five main semantic categories:

1. *Technology and human-machine interaction. This category centers on the interaction between machines and individuals, with a particular focus on the responsible use of technology. Education and institutional roles serve as key levers of change. The "individual" node introduces the theme of multidisciplinary education, which is essential for managing the human-machine relationship. Keywords such as "philosophical subjects" and "digital skills" further indicate the need to bridge the gap between humanities and STEM disciplines, fostering synergies across fields to equip individuals with the skills required for effective AI interaction.*
2. *AI as a global and local phenomenon. This category positions AI as a transformative technological force in education, capable of reshaping the role of universities within society and learning environments. The analysis underscores the need to strengthen connections between universities and schools, as well as between the educational and economic sectors. Universities emerge as the primary drivers of skills development among young people, with a strong emphasis on aligning academic degrees with the requirements of new professions.*
3. *Training models. This category focuses on educational models, particularly the structuring of study programs and the modularity and flexibility of their design (e.g., elective courses offered in a modular format). AI is perceived as a challenge, as indicated by the strong association between the terms "training models" and "challenge." This challenge encompasses both learning processes and skill development, particularly soft skills.*
4. *Skills development. This category revolves around the concepts of competencies and professions, highlighting keywords such as "skills acquisition", "learning processes", and their connection to the labor market. The analysis suggests that continuous training is a crucial tool for updating skills and aligning professional profiles with market needs.*
5. *International collaborations. Another key category relates to international partnerships, emphasizing the importance of European alliances and the globalization of training institutions. Education experts consider these collaborations to be critical for tackling AI-related challenges, both in terms of educational practices and the evolution of professional roles.*

b) CEOs Panel

The CEOs' narratives revolve around four key terms-technology, work, data management, and corporate organization-in addition to the overarching theme of artificial intelligence.

The term "technology" suggests the role of AI as a central driver of transformation, affecting data management, corporate structures, and innovation processes within both economic and societal frameworks. AI is perceived not only as an economic tool but also as a social phenomenon, as indicated by the prominence of keywords like "culture" and "human being."

The systematic analysis of these terms reveals a strong emphasis on the need for a responsible and conscious adoption of AI. This perspective highlights the importance of fostering trust and an open corporate culture, promoting ethical AI use, and ensuring that technological advancements are fully integrated into human-centered business environments.

Additionally, the frequent mention of "work", "skills", "individual", and "training" underscores CEOs' recognition of AI's impact on labor dynamics. This transformation extends beyond automation, encompassing skill development, workforce adaptation, and the creation of new professional roles.

The CEOs' discourse is structured around three focal areas, each analyzed through ego network mapping: business models, competencies, and processes. These clusters reflect how AI is shaping corporate strategy, workforce skills, and organizational decision-making.

1. *Business Models. AI is seen as a transformative force reshaping business models by redefining value creation mechanisms. Key areas of impact include resources, data, and core activities, which drive the development of AI-powered products and services. A particularly strong association emerges between business models and data management, highlighting how AI enhances strategic decision-making through predictive analytics and competitive insights. This data-driven approach strengthens companies' adaptability in dynamic markets, fostering flexibility, innovation, and business growth.*
2. *Competencies. AI is fundamentally altering the landscape of required workforce competencies, expanding beyond technical expertise to encompass managerial and strategic skills.*
   While AI-related technical skills (e.g., machine learning, information technology, and language models) remain crucial, CEOs emphasize the growing importance of strategic thinking and competitive analysis. Additionally, soft skills such as adaptability and continuous learning emerge as key factors in navigating AI-driven transformation.
   The strong link between competencies, training, and work in the ego network underscores the urgency of upskilling and reskilling initiatives. AI is accelerating the need for educational programs that align with evolving job market demands, reinforcing the creation of new professional roles.
3. *Processes. AI is redefining corporate processes, particularly in decision-making and data-driven management. The CEOs' discourse highlights how AI-powered predictive analytics and data management support more informed, agile, and proactive decision-making models. This shift reflects AI's role as a strategic enabler, not merely an automation tool, enhancing organizational responsiveness and efficiency. The increasing reliance on AI for adaptive decision-making further underscores its integration into the core functions of modern enterprises.*

Comparative analysis: alignments and tensions in AI-driven transformation

The interviews with CEOs and education experts provide valuable insights into the AI-driven transformation of education and its spillover effects on skills and the labor market. The findings presented highlight both areas of alignment and divergence in how AI is reshaping competencies, learning models, and the workforce.

A key point of convergence is the recognition of AI not merely as a support tool but as a transformative force influencing both business strategy and education systems. Both panels emphasize the need for continuous skills development to adapt to AI-driven shifts in the labor market. While both groups acknowledge the importance of lifelong learning as a response to these changes, CEOs focus on AI's role in enhancing strategic decision-making and business efficiency, particularly in terms of skill demands and emerging professional roles. In contrast, training experts stress the need for educational programs that integrate technical, managerial, and transversal skills to adequately prepare individuals for these evolving roles. Similarly, both groups recognize the central role of universities in bridging the gap between academia and industry. There is a shared emphasis on strengthening the dialogue between educational institutions and businesses to improve the alignment between labor supply and demand, fostering new opportunities in an AI-transformed job market.

Among the areas of divergence, on the contrary, significant dissonances in priorities and approaches emerge. While CEOs focus on AI as a driver of competitiveness and productivity, mostly viewing its impact through the lens of business models, operational efficiency and decision-making processes, and prioritizing data-driven strategies, predictive analytics and automation as key enablers of business growth, on the contrary, education experts take a broader and more systemic view, emphasizing the ethical, cognitive and social dimensions of AI adoption. Their more holistic vision reflects concerns about the responsible use of AI, human-centered learning models and the integration of multidisciplinary approaches, especially the need to balance STEM and humanities education.

These differences reveal an underlying tension between short-term efficiency and long-term adaptability, two contrasting but parallel needs. Short-term efficiency is mostly sought by CEOs in immediate AI-driven benefits for organizational performance, while long-term benefits are preferred by the panel of education experts through a sustainable and inclusive learning framework that fosters critical thinking and ethical awareness along with technological expertise. To address this gap and seize both short-term and long-term opportunities, coordinated efforts are needed to align business needs with education policies, ensuring that AI adoption leads to both economic innovation and social responsibility.

This comparative analysis therefore highlights the keystone to resolve such tensions in cross-sectoral dialogue and strategic cooperation between business and education, to manage AI-driven transformation with both technical and human-centric skills.

Research limitations. *The study, still in progress, presents the preliminary results of the first 20 interviews. This limited sample size imposes obvious constraints on the generalizability of the findings, which may not fully represent the views and experiences of a broader population. Additionally, the sample was selected using a non-probability sampling method, which could introduce bias in terms of representativeness. The inclusion of CEOs from large companies and experts in higher education may limit the diversity of perspectives. Further development of this study could address this limitation by employing a quota sampling approach to ensure a more balanced representation across different sectors and organizational levels.*

Managerial implications. *This research provides managerial implications for both businesses and educational institutions. For companies, it emphasizes the importance of designing continuous training programs focused on micro-competencies to bridge the skill gaps emerging from the disconnect between traditional, linear training programs and the rapidly evolving technological landscape.*

Companies investing in AI integration can achieve significant benefits in operational efficiency, productivity, and revenue growth. However, these results depend not only on the technology itself but on how it is adopted-by fostering collaboration between human and artificial intelligence and creating a culture of learning, collaboration, and innovation. Businesses should integrate both hard and soft skills development, ensuring that employees are equipped not only with technical knowledge but also with critical thinking, creativity, and adaptability, which are essential in today's rapidly changing environment.

For educational institutions, the recommendation is to adapt curricula to be more dynamic and aligned with industry demands, encouraging lifelong learning practices that reflect the ongoing need for skills updating. Educators will play a key role as learning designers, helping students develop personalized, interdisciplinary competencies connected to real-world challenges. AI can assist in innovating curricula, automating routine tasks, and creating learning resources, enabling educators to focus on high-value activities such as mentorship and designing engaging, interactive learning experiences. Both sectors are urged to enhance collaboration to address the challenges posed by disruptive technologies, ensuring that education and training evolve in tandem with these changes.

Originality of the paper. *Our work stands out by offering a unique perspective that compares both managerial and academic viewpoints. This dual approach provides a comprehensive and systemic understanding of the impacts of AI on education and workforce development. By proposing a comparative framework that bridges the emerging skill gaps in both corporate and academic environments, our research offers a practical solution for adapting education and training to today's dynamic technological landscape, distinguishing our work as an innovative contribution to the field. The paper contributes to current debates in the fields of innovation management and education strategy by framing AI not only as a technological shift but as a socio-organizational transformation that requires rethinking the design of learning systems, both within firms and educational institutions. AI's transformative potential in education necessitates a balanced approach to skills development, integrating technical, managerial, and soft skills. This multidimensional focus enhances the existing literature on workforce reskilling and lifelong learning in AI-driven contexts.*

By fostering dialogue between academia and industry, educational institutions can better align curricula with evolving market needs. In doing so, the study addresses a gap in the literature by offering empirical insights into how different actors, managers and educators, are interpreting and reacting to AI, and what this means for the future of human capital development. The study's comparative analysis highlights the importance of integrating ethical considerations with technical advancements, promoting a holistic and adaptive educational paradigm.

Key words: *artificial intelligence; education; AIed; skills; lifelong learning; educational reform*

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Leveraging AI for Internationalization: The Role of Artificial Intelligence in the Global Expansion of Italian Startups

NOHAILA KARTTI[1] CHIARA CANNAVALE[2]

Abstract

This study aims to investigate how Italian startups strategically integrate and implement AI technologies within their international strategies. The objective is to understand how these technologies impact various critical stages of internationalization process, including market identification, opportunity assessment, risk management, customer adaptation, and operational efficiency in international activities. This study employs a qualitative case study approach, which is well-suited for exploring complex and context-specific phenomena, such as the relationship between AI adoption and the internationalization processes of early-stage firms. Both primary and secondary data sources will be utilized to achieve methodological triangulation, which enhances the credibility and reliability of the findings. The thematic approach will be used to analyze the collected data. This will be combined with process tracing techniques to reconstruct the sequence of decisions, actions, and adaptations through which AI tools were implemented to support internationalization objectives. The implementation of AI brings new dynamics that challenge, enhance, and, in some instances, completely transform these processes. This research offers several managerial insights for startup founders, executives, and ecosystem stakeholders, providing practical perspectives on how AI-driven decision-making can improve international expansion. This study makes a unique contribution to the fields of international entrepreneurship, digital transformation, and the growing role of artificial intelligence (AI) in global business strategy. A key conceptual innovation of this paper is its argument that AI adoption does not merely enhance existing internationalization pathways, but rather reconfigures the logic through which startups identify, evaluate, and pursue international opportunities.

Framing of the research. *In the continuously evolving global business landscape, adopting digital technologies within corporate strategies has become a fundamental factor, redefining the mechanisms of market expansion and competitive dynamics. (Di Vaio et al., 2020; Wei & Pardo, 2022).*

Digital technologies can facilitate the international growth of firms (Jean et al., 2010; Sinkovics et al., 2013), equipping smaller enterprises with innovative tools and strategies to access and engage global markets. Additionally, they offer new methods for structuring economic activities and managing business operations (Falahat et al., 2020). These aspects have recently attracted increasing scholarly interest (Bettiol et al., 2020; Cassetta et al., 2019; Hannibal and Knight, 2018; Laplume et al., 2016; Strange and Zucchella, 2017).

Beyond studies examining internet-facilitated internationalization and the impact of e-commerce on global expansion (Bell and Loane, 2010; Hamill, 1997; Nummela, 2010; Reuber and Fischer, 2011; Sheth and Sharma, 2005), limited research has explored how digitalization enables or constrains the international growth of startups (Neubert, 2018). Existing literature mostly emphasizes digitalization as a communication and sales channel, highlighting its role in accelerating early-stage global expansion. However, digitalization is an extensive concept that includes various aspects of both business and daily life (Hagberg et al., 2016). It incorporates a wide range of technologies and applications, including, for example, Artificial Intelligence, cybersecurity, cloud computing, and smart robotics. Due to its broad scope and complexity, digitalization can sometimes seem both all-encompassing and unclear. To better understand its specific aspects, more research should focus on particular types of digitalization. (Denicolai et al., 2021)

Building on this perspective, we focus on Artificial intelligence (AI) as a key digital technology since it stands out as a major trend in digital innovation, significantly transforming global business and internationalization process (Burström et al., 2021; Denicolai et al., 2021; Ghauri et al., 2021). In today's globally connected environment, where international trade and cooperation have become standard practices, AI plays a key role in facilitating and enhancing the process of internationalization (Gölzer and Fritzsche, 2017; Li et al., 2018).

This research refers to AI in its broadest sense, encompassing the wide range of smart process automation, intelligent systems, and the algorithmic economy. (Azkan et al., 2019; Martinez-Lopez and Casillas, 2013). Moreover, AI can also be described as a cognitive technology, referring to computer-based systems that assist in decision-making (Watson,

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2017; Montes and Goertzel, 2019). It represents one of the most unique and impactful applications of AI, where decisions supported by cognitive technologies range from everyday tasks to high-level strategic decisions (Denicolai et al., 2021).

In this paper, we specifically focus on startups, since within the startup ecosystem, the constraints of limited size and early-stage development often create challenges for international expansion. AI provides a strategic advantage and a practical tool to help navigate global growth more effectively (Neubert, 2018).

Although research on international entrepreneurship has extensively examined the influence of entrepreneurial orientation, innovation capability, and networks in facilitating early internationalization, the specific role of AI as a catalyst, accelerator, and shaper of global expansion remains underexplored (Denicolai et al., .2021).

This study aims to investigate how Italian startups strategically integrate and implement AI technologies within their international strategies. The objective is to understand how these technologies impact various critical stages of internationalization process, including market identification, opportunity assessment, risk management, customer adaptation, and operational efficiency in international activities.

The theoretical framework of this study draws on three key perspectives. First, international entrepreneurship theory (Oviatt & McDougall, 1994) offers a valuable lens for exploring the proactive, innovative, and risk-taking behaviors that define startups pursuing early internationalization. In this context, AI is considered as a crucial enabler of entrepreneurial agility, allowing startups to quickly identify, assess, and seize opportunities across distant markets.

On the other hand, dynamic capabilities theory (Teece, 2007) provides a process-focused view of how firms identify opportunities, mobilize resources to capitalize on them, and continuously shape their internal processes to maintain a competitive edge in fast-changing environments. In this context, AI is seen as a tool that enhances capabilities, particularly through its ability to identify international opportunities via real-time data analysis, support market entry with flexible, tailored strategies, and optimize internal operations to meet the unique demands of each foreign market

Third, the expanding literature on digital internationalization (Autio et al., 2018) and technology-driven globalization emphasizes the critical role of digital tools, such as AI, in lowering the resource barriers to internationalization. This enables even the smallest firms to pursue global expansion without needing significant upfront investments in physical assets (Denicolai et al., 2021).

Purpose of the paper. *This study aims to explore, conceptualize, and empirically examine the role of AI as a transformative force in the internationalization of Italian startups. It investigates how AI-driven capabilities shape key aspects of the international expansion process, including opportunity recognition, market selection, strategic adaptation, and the overall trajectory of international growth.*

The internationalization processes of technology startups have been widely studied (Cavusgil & Knight, 2015; Oviatt & McDougall, 1994), while the transformative impact of advanced technologies, particularly artificial intelligence (AI), has not yet been fully incorporated into established theoretical frameworks. Although the increasingly interest in the digital internationalization of firms (Monaghan et al., 2020; Coviello et al., 2017), existing research has mainly centered on digital platforms, e-commerce ecosystems, and online marketing capabilities.

Therefore, the main objective of this study is to examine the implications of AI integration in the internationalization of startups. This research aims to determine whether Italian AI-driven startups follow unique internationalization trajectories, adopt different knowledge frameworks and decision-making logics, and how the interaction between algorithmic and human decision-making influences critical aspects of the internationalization process, such as partner selection, market entry timing, and product/service localization strategies.

Instead of treating AI simply as a tool for enhancing efficiency, this study conceptualizes AI as both a cognitive and strategic agent within the firm. It explores how AI not only transforms existing knowledge but also redefines how international opportunities are identified, understood, and pursued.

Accordingly, the research question of this work is:

How do Italian startups leverage AI to drive their internationalization?

Methodology. *This study employs a qualitative case study approach, which is well-suited for exploring complex and context-specific phenomena (Mogaji et al., 2022; Eisenhardt, 1989; Yin, 2017), such as the relationship between AI adoption and the internationalization processes of early-stage firms.*

This interpretative phenomenological approach helps gain a deeper understanding of stakeholders' personal experiences, offering valuable insights into their perceptions, motivations, and challenges related to AI integration. The flexibility of qualitative research methods further supports this process by allowing researchers to adapt data collection strategies and identify emerging themes within a rapidly changing technological landscape (Creswell & Creswell, 2018; Patton, 2015).

Moreover, this approach facilitates the analysis of data from multiple cases through an ongoing comparison between theoretical concepts and empirical data, aiming to establish a robust alignment between the two (Creswell & Creswell, 2018; Gehman et al., 2018). Comparing similarities and differences across cases also enables the researcher to identify potential patterns, trends, or connections, thereby supporting the development of inductive theories (Eisenhardt & Graebner, 2007; Welch et al., 2020; Yin, 2017).

Based on the six criteria outlined by Miles and Huberman (1994) (i.e., alignment with the conceptual framework, ability to generate detailed insights into the phenomena of interest, credibility (real-life applicability), generalizability, ethical considerations, and feasibility), purposive sampling was identified as the most suitable approach for this study.

Specifically, the selected startups meet the following criteria:

1. *they were founded within the last ten years, ensuring they are part of the recent wave of digitally-native firms*
2. *they actively leverage AI tools in at least one core internationalization process-including market intelligence, customer adaptation, risk management, or operational efficiency- thereby ensuring theoretical relevance*
3. *they have successfully entered at least one foreign market, demonstrating a clear international footprint.*

Both primary and secondary data sources will be utilized to achieve methodological triangulation, which enhances the credibility and reliability of the findings (Gibbert & Ruigrok, 2010). Primary data collection involves semi-structured interviews with founders and managers of each startup. These interviews explore the motivations for AI adoption, the specific tools and platforms used, the decision-making processes surrounding market selection and entry, the perceived benefits and limitations of AI tools, and the role of AI in continuous adaptation and learning in foreign markets.

The data collection process also incorporates secondary sources, such as media articles, industry reports, and official documents, which help to define the broader technological environment influencing AI adoption and internationalization opportunities in each case.

This multi-source triangulation ensures that the findings do not only rely on self-reported perceptions, which can be subject to retrospective bias or strategic exaggeration, especially in highly competitive startup ecosystems (Podsakoff et al., 2003).

The thematic approach outlined by Braun and Clarke (2006) will be used to analyze the collected data. This will be combined with process tracing techniques (Langley, 1999) to reconstruct the sequence of decisions, actions, and adaptations through which AI tools were implemented to support internationalization objectives.

This methodological design supports the study's broader ambition of theory building (Birkinshaw et al., 2011; Eisenhardt & Graebner, 2007). By identifying and theorizing the mechanisms through which AI shapes internationalization processes, the study contributes to the emerging literature on digital internationalization (Autio et al., 2018), while also enriching established theories of international entrepreneurship (Oviatt & McDougall, 1994) and dynamic capabilities (Teece, 2007) with technology-sensitive insights.

Expected Results. *The Uppsala model (Johanson & Vahlne, 2009) suggests that firms expand internationally step-by-step, learning from experience. However, this may not fully apply to startups using AI. Instead, the research is likely to show that AI allows firms to bypass this gradual process, helping them enter multiple foreign markets by using data-driven insights rather than slow, incremental learning (Coviello et al., 2017).*

Another expected outcome is that AI shifts the role of entrepreneurial decision-making process in internationalization. Traditionally, entrepreneurial decision-making relied on heuristics, personal networks, and subjective assessments of foreign markets (Arenius, 2005). However, AI-driven startups are expected to rely more on algorithmic decision-making, where AI tools analyze large amounts of data reducing human bias and uncertainty (Brynjolfsson & Mitchell, 2017).

While AI-driven internationalization offers many advantages, it also comes with challenges that firms will need to navigate. The research is expected to show that although AI improves scalability and efficiency, it doesn't remove the complexities of dealing with cultural, institutional, and regulatory differences in different markets (Agrawal et al., 2022).

he findings are expected to provide a deeper understanding of how AI fits into internationalization strategies. Rather than replacing traditional entrepreneurial theories, the research is likely to show that AI should be seen as a tool to enhance strategy, combining the power of data with human insights, cultural understanding, and adaptable decision-making (Ozturk, 2024).

In summary, this research aims to challenge traditional internationalization theories, demonstrating that AI is not just a facilitator but a transformative force in how firms expand globally (Denicolai et al., 2021). Thus, instead of completely replacing traditional market-entry strategies, AI works best as an enhancement.

Research limitations. *This research wants to offer valuable insights into the role of AI in startups internationalization process. However, it is important to recognize its limitations. One of the first limitations of this study arises from its multiple case study approach. Even if a qualitative research approach was appropriate for addressing our research questions, the focus on a limited number of firms and respondents restricts the generalizability of the findings to a wider range of industry sectors (Taylor et al., 2021)*

Since this research focuses on a small number of startups (located in Italy) , the findings may not be fully applicable to all firms, especially those in different industries, business models, or institutional environments (Yin, 2017).

Additionally, case study research relies heavily on subjective interpretation, which introduces the risk of researcher bias. Even though efforts are made to ensure triangulation through multiple data sources, the interpretation of AI's role in internationalization may still be influenced by the researcher's own theoretical perspective (Dubois & Gadde, 2002). Future research could mitigate this limitation by complementing case studies with large-scale empirical analyses using quantitative techniques.

Furthermore, AI's impact on internationalization varies across industries and regions, making it difficult to ensure representativeness. This study focuses on italian startups, which may not reflect the experiences of firms in other countries and regions.

Managerial implications. *The implementation of AI into internationalization strategies marks a significant shift in how technology can affect startups' approach to global markets. Traditional theoretical models mainly focus on learning from experience, expanding through networks, and gradually adapting to foreign market conditions (Johanson & Vahlne, 2009; Coviello et al., 2017). The implementation of AI brings new dynamics that challenge, enhance, and, in some instances, completely transform these processes. This research offers several managerial insights for startup founders,*

executives, and ecosystem stakeholders, providing practical perspectives on how AI-driven decision-making can improve international expansion.

The first implication is the need to reconsider how international opportunities are identified and assessed. Traditionally, entrepreneurs have depended on network connections, personal experiences, and intuitive decision-making to choose which markets to enter (Autio et al., 2021). Nowadays, AI-driven analytics allow startups to analyze large volumes of real-time data, simulate potential market scenarios, and predict demand with a level of accuracy that was previously impossible (Agrawal et al., 2022; Ozturk, 2024). This capability not only minimizes uncertainty and cognitive biases in market selection but also enables firms to act faster and more efficiently.

AI also transforms how startups manage risk in foreign markets. International expansion is challenging due to cultural differences, regulatory complexities, and shifting competitive dynamics (Meyer & Peng, 2016). AI-powered risk models, which analyze factors such as geopolitical trends, trade flows, and consumer sentiment, offer real-time risk assessments, enabling firms to anticipate challenges and refine their strategies proactively (Ozturk, 2024).

This has several implications for internationalization strategies, as startups can dynamically reconfigure their international operations based on AI-generated insights rather than relying solely on previous experiences.

As AI becomes more integrated into internationalization strategies, startup teams will need to adapt. Companies must hire talent that understands both AI technology and international business, forming cross-disciplinary teams that connect technical skills with strategic decision-making. Additionally, the use of AI in decision-making brings up concerns about organizational flexibility and the balance between centralized and decentralized decision-making. While AI supports data-driven centralization, startups must ensure that local market managers still have the freedom to interpret AI insights and adjust strategies according to local conditions.

Originality of the paper. *This study makes a unique contribution to the fields of international entrepreneurship, digital transformation, and the growing role of artificial intelligence (AI) in global business strategy. While there is a significant body of research on the internationalization processes of startups, particularly within the established born global and international new ventures (INVs) models (Cavusgil & Knight, 2015; Oviatt & McDougall, 1994), these frameworks were developed before AI became widely integrated into entrepreneurship and internationalization. As a result, they are not fully equipped to capture the profound ways in which AI-driven startups are changing the mechanisms, sequences, and even the decision-making processes of international expansion.*

A key conceptual innovation of this paper is its argument that AI adoption does not merely enhance existing internationalization pathways, but rather reconfigures the logic through which startups identify, evaluate, and pursue international opportunities. Traditional theories emphasize gradual experiential learning and network-embedded opportunity identification (Johanson & Vahlne, 2009; Cavusgil & Knight, 2015), while the rise of AI introduces the possibility of data-driven, algorithmic learning at a scale and speed that fundamentally alters the relationship between knowledge, experience, and international strategic action (Autio et al., 2021). This reframing challenges the prevailing temporal assumptions embedded in Uppsala-type models and raises new questions about the role of managerial cognition and entrepreneurial intuition when much of the opportunity identification process is increasingly mediated by machine learning models and predictive algorithms (Brynjolfsson & Mitchell, 2017).

At the empirical level, the paper's originality lies in its focus on real-world cases of startups that are not only internationalizing but doing so with AI as an embedded, dynamic capability influencing their decision-making, operational adaptation, and competitive positioning.

Much of the current literature on digital internationalization focuses on e-commerce platforms, digital marketplaces, and the role of social media in reducing psychic distance and accelerating cross-border reach (Monaghan et al., 2020; Coviello et al., 2017). However, there remains a striking gap in research examining how AI specifically influences internationalization pathways to encompass strategic foresight, risk assessment, product localization, and even adaptive business model transformation in response to real-time international market signals (Arshi et al., 2022).

By grounding the analysis in multiple, data-rich case studies of AI-enabled startups actively navigating international markets, this research addresses this gap and offers many insights into how AI shapes not only firm-level strategies, but also the entrepreneurial cognition and organizational learning processes underpinning them.

Key words: *internationalization; Artificial intelligence; startup; international entrepreneurship; dynamic capabilities; digitalization*

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The Role of International Knowledge in China's Artificial Intelligence Ecosystems

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Abstract

Entrepreneurial ecosystems (EEs) play a pivotal role in fostering regional economic growth and innovation, especially in the context of emerging technologies like artificial intelligence (AI). This study examines the impact of international collaboration and knowledge sharing on innovation capacity within China's AI-focused EEs. Utilizing a patent-based citation analysis, we explore how cross-border knowledge flows influence AI innovation performance across a panel dataset of 1,858 Chinese AI firms from 2014 to 2019. Our findings indicate that international collaboration significantly enhances innovation capabilities, evidenced by positive correlations with AI innovation performance, and enterprise value in both static and dynamic panel models. This study contributes to the EE literature by highlighting the importance of global interconnectedness and the role of foreign knowledge in enhancing the innovation potential of EEs. The implications suggest that robust international networks are crucial for firms aiming to innovate in AI, pointing to the need for policies that support international cooperation and knowledge exchange to sustain competitive advantages in the global market.

Framing of the research. *Entrepreneurship has been recognized as a driving force for economic growth and regional development (Benneworth 2004). Local infrastructures and resources have proven essential in facilitating the development of entrepreneurial activities (Van De Ven 1993). The development of a healthy entrepreneurial ecosystem (EE) is now deemed vital for regional development (Alvedalen and Boschma 2017).*

An EE tends to be described as a set of interdependent actors and factors or as an interaction system composed of hierarchically independent but coordinated stakeholders that enable productive entrepreneurship within a particular territory (Stam and Spigel 2016; Autio et al. 2018). However, there is still debate around the precise definition of EE and how it differs from other concepts that also aim to explain the geographical concentration of entrepreneurial activities like clusters, regional innovation systems, and networks (Acs et al. 2017; Spigel and Harrison 2018).

Following the knowledge-based view of the firm (Grant 1996), prioritizing and maintaining knowledge sharing both within and outside the company's boundaries becomes crucial for innovation. With the evolution of EEs, information sharing between organizations and improvement of knowledge management capabilities become easier (Ferreira et al. 2023). Furthermore, firms with international experience and networks are more likely to engage in exploratory innovation, which can lead to the development of new products, processes, and technologies (Nambisan et al. 2019).

The concept of entrepreneurial ecosystems has evolved significantly over the past two decades, with scholars increasingly recognizing the importance of open innovation, knowledge brokerage, and cross-border collaboration in fostering technological progress (Autio et al., 2018; Stam & Spigel, 2016). Within this framework, the role of knowledge brokers has gained prominence, as firms and institutions strategically position themselves to facilitate the exchange and recombination of ideas across different innovation networks (Cricchio et al. 2025).

Recent studies have shown that the strength of global embeddedness of EEs is likely to develop sectorial orientations (Audretsch and Belitski 2021). In the Chinese context, regional governments' primary role in providing public and social services contributes significantly to the expansion of entrepreneurship within regional EEs (Wei 2022). China hosts prominent examples of vibrant EEs where iterative resource dynamics foster sustained competitiveness, leading to regional economic development (Shi and Shi 2022).

China has made significant strides in AI innovation, competing globally in terms of patent applications and scientific publications, reflecting its impressive research output and innovation capabilities (World Intellectual Property Organization 2019, 2024). These elements shape an entrepreneurial ecosystem where both indigenous and foreign knowledge play crucial roles. China is now one of the world leaders in AI adoption (Castro and McLaughlin 2021), largely due to its vast data availability (Yu et al. 2022). The country hosts the second-largest cluster of AI firms, concentrated in Beijing, Shanghai, Shenzhen, and Hangzhou. The increasing role of universities, AI entrepreneurs, digital

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platforms, and government bodies at both national and local levels further accelerates innovation (Arenal et al. 2020; Jacobides et al. 2021; Yu et al. 2021).

In particular, China's Big Tech firms act as hyperscalers while simultaneously fostering smaller firms' digitalization and AI adoption. This contributes to the development of a more equitable tech ecosystem where key firms strengthen their positions by ensuring a balanced network of complementors (Cricchio et al., 2025). This strategic approach underpins China's AI ecosystem and reinforces the importance of cross-border knowledge exchange.

Purpose of the paper. *This study aims to examine the role of international knowledge and cooperation in the development of China's AI ecosystem. The EE literature lacks a comprehensive understanding of the role of knowledge circulation across EE's geographical boundaries since the majority of prior studies have mainly focused on a domestic context (Acs et al. 2017; Theodoraki and Catanzaro 2022). We aim to fill these research gaps by analyzing the EE in an international context and its connection to the role of innovation activities.*

Research on the boundaries of ecosystems, their openness, and their governance structure remains underdeveloped (Colombo et al. 2019). For innovative firms, being involved in an EE brings advantages in terms of knowledge acquisition possibilities and increases the types of collaborative activities available. In this regard, even though international cooperation can be risky, it also provides greater knowledge access and stronger relational ties (Ferreira et al. 2023).

Recently, private and public actors in China have been strongly collaborating to develop AI technology (Jacobides et al., 2021). Collaboration is encouraged at both national and regional levels through various innovation policies (Wu et al. 2020). While Chinese AI development objectives have been distinctly delineated by national and regional boundaries, with a focus on enhancing indigenous innovation, foreign knowledge has historically played a pivotal role in China's technological progress (Chen et al. 2021). AI is a general-purpose technology (GPT) that thrives on the recombination of knowledge across different disciplines and geographical boundaries. The integration of foreign expertise, intellectual property, and collaborative R&D partnerships is critical for firms aiming to sustain competitive advantages in AI innovation (Cockburn et al. 2019). Unlike traditional innovation models that emphasize closed R&D processes, AI firms increasingly rely on strategic alliances, patent-sharing mechanisms, and knowledge diffusion strategies to maintain technological leadership (Nylund and Brem 2023). Therefore, in this study, we ask: what is the role of international knowledge and international cooperation in the development of the Chinese AI ecosystem?

Despite these advancements, significant gaps remain in the literature regarding the role of foreign knowledge in China's AI entrepreneurial ecosystem. Most studies focus on national innovation policies and indigenous technological capabilities, overlooking the critical contributions of international collaborations, joint ventures, and foreign direct investments (FDIs). This study addresses these gaps by exploring the extent to which foreign knowledge flows influence AI innovation performance within China's entrepreneurial ecosystems, offering new insights into the mechanisms of cross-border knowledge exchange and its implications for ecosystem development.

We use a patent-based citation analysis from a longitudinal perspective to examine how international knowledge flows affect innovation performance in China's AI ecosystem. We formulate the following research hypothesis:

H1: International collaboration and knowledge sharing positively correlate with the EE's capacity to innovate in AI.

Methodology. *To test our hypothesis, we retrieved data from Orbis Intellectual Property Database, Orbis Database, China Statistical Yearbook, and China Statistical Yearbook on Science and Technology for 2014-2019 following. Following the approach of Liu et al. (2021), that combines keyword search with IPC and CPC codes, we identified AI-related patents and hence the Chinese AI firms. We constructed an unbalanced panel dataset of 1858 firms. The sample includes firms from various sectors, including technology, manufacturing, healthcare, finance, and transportation, reflecting the cross-industry applicability of AI technologies.*

Given AI's role in fostering innovation and technological advancements, our methodological approach involved a panel regression with firm and time-fixed effects to account for unobserved heterogeneity. This model ensures that differences in innovation performance are not solely attributed to firm-specific characteristics or time trends but rather to variations in international knowledge inflows. The equation used for the regression model is expressed as:

$$lnY_{i,t} = \alpha + \beta lnX_{i,t-1} + \varphi_i + l_t + \varepsilon_{i,t}$$

where $Y_{i,t}$ represents the dependent variables: (1) AI Innovation Performance (AI_inn), measured by the number of AI-related patents granted by Chinese National Intellectual Property Agency excluding patents with foreign backward citations; (2) Return on Equity (ROE), calculated as net income divided by shareholders' equity; and (3) Enterprise Value (EV), determined as the sum of a firm's market capitalization and its short- and long-term borrowings.

The key independent variable, Foreign Knowledge (FK), is operationalized as the number of AI patents with backward citations originating from foreign applicants. This variable captures the extent to which firms leverage external knowledge sources for innovation. Control variables include firm size (measured by the number of employees), intangible assets, tangible assets, firm age, debt levels, profit, and revenue. Independent and control variables are lagged by one year to reduce endogeneity concerns and to ensure that their effects on innovation outcomes are not confounded by simultaneous influences.

Results. *The regression analysis confirms our hypothesis that foreign knowledge flows significantly enhance indigenous AI innovation performance and enterprise value within China's AI ecosystem. The results from our static panel models reveal a positive and statistically significant correlation between Foreign Knowledge (FK) and both AI Innovation Performance (AI_inn) and Enterprise Value (EV), supporting the notion that access to international expertise strengthens firms' technological capabilities.*

Specifically, firms with higher exposure to international knowledge networks-measured through foreign backward citations-exhibited superior innovation outcomes, as indicated by an increased number of AI-related patents. This finding suggests that cross-border knowledge flows play a crucial role in enabling firms to engage in knowledge recombination, a key driver of AI advancement. Furthermore, firms with access to foreign expertise demonstrated improved enterprise valuation, indicating that international knowledge inflows contribute to firms' financial strength and long-term sustainability.

The results also indicate that AI firms operating within well-connected ecosystems benefit from greater knowledge spillovers, which, in turn, enhance their ability to develop cutting-edge AI applications. This aligns with prior studies emphasizing the role of ecosystems in facilitating productive entrepreneurship (Autio et al., 2018; Stam & Spigel, 2016). Additionally, firms that engage in global partnerships and maintain strong international linkages outperform their counterparts with domestic-only innovation strategies, reinforcing the importance of global knowledge flows (Nambisan et al. 2019).

	Indigenous AI innovation performance	Return on Equity	Enterprise Value
AI Foreign Knowledge flows t-1	**0.1320*** ** (0.0234)	0.0179 (0.0444)	**0.1250*** ** (0.0464)
Number of firms	1858	1858	792
Number of obs.	7633	7432	3524
Control variables	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Research limitations. *While this study provides valuable insights into the role of international knowledge in China's AI ecosystem, it also has certain limitations.*

First, the study relies on patent data as a primary indicator of innovation performance, which, while widely used, does not capture all dimensions of AI innovation. Many advancements in AI occur through software development, algorithmic improvements, and trade secrets, which are not always patented.

Second, the analysis focuses on backward citations in AI patents as a measure of international knowledge flows. However, collaborations, joint ventures, and foreign direct investment (FDI) also play crucial roles in knowledge transfer, which are not fully captured in this approach. Future research could integrate qualitative methods, interviews, or case studies to complement the patent-based network analysis.

Third, regional and sectoral differences within China's AI ecosystem are not deeply explored. While our dataset covers 1,858 firms across multiple regions, the specific regional policies, firm-level strategies, and localized knowledge dynamics might influence the impact of international knowledge flows differently. A more granular, region-specific analysis could further refine our understanding of China's AI ecosystem.

Finally, the study covers the period from 2014 to 2019, which does not account for more recent AI developments, particularly in light of evolving geopolitical tensions, policy shifts, and the impact of new AI regulations in China and globally. Future research could extend the time frame to capture longer-term trends and post-2020 developments in AI innovation.

Despite these limitations, our findings highlight the critical role of international knowledge flows in fostering innovation within China's AI ecosystem and provide a foundation for further research on global innovation networks.

Managerial and policy implications. *Several noteworthy implications emerge for policy and management. Businesses with robust international networks exhibit a heightened ability to innovate in AI. Amid the prevailing notion of AI as the new development catalyst, accompanied by geopolitical tensions, lies an opportunity for coordinated global collaboration in technology advancement. Policymakers are urged to foster international cooperation within the AI domain, facilitating the expansion of businesses beyond local boundaries through internationalization support.*

The findings of this study suggest important managerial and policy implications for businesses, government agencies, and international organizations engaged in AI development. From a managerial perspective, firms operating within China's AI ecosystem must recognize the strategic importance of international knowledge flows in enhancing their innovation capabilities. Companies that actively engage in cross-border collaborations, participate in international research initiatives, and form strategic alliances can gain a competitive edge by leveraging diverse knowledge sources. Given AI's role as GPT driving digital and green transitions, firms should prioritize partnerships that allow them to access cutting-edge research, specialized expertise, and novel technological applications beyond domestic boundaries.

Beyond the firm level, this study underscores the need for policy interventions that foster global knowledge exchange while balancing national innovation priorities. Governments should actively promote bilateral and multilateral agreements that facilitate AI knowledge flows by reducing barriers to international research collaboration, harmonizing IP protection frameworks, and establishing data-sharing protocols. Policies that support the internationalization of AI firms-such as targeted funding programs, tax incentives, and AI-specific incubators-can further enhance firms' ability to expand into global markets. For startups and SMEs, in particular, access to international AI hubs can provide critical opportunities for scaling and integrating into global AI supply chains.

At the same time, China's push for indigenous AI innovation must be carefully balanced with the continued inflow of foreign expertise. While national strategies increasingly emphasize self-sufficiency, the evidence suggests that international knowledge remains a key driver of technological progress. A flexible and adaptive policy framework is needed to ensure that China's AI sector remains competitive while navigating challenges such as technology transfer restrictions and evolving geopolitical tensions. Striking this balance will require regulatory approaches that encourage domestic research excellence while maintaining access to global knowledge networks.

Finally, as AI adoption accelerates, policymakers must address broader concerns related to AI governance, ethical AI development, and regulatory oversight. International knowledge sharing plays a crucial role in establishing best practices for AI transparency, accountability, and fairness, ensuring that AI ecosystems develop in a way that is both innovative and responsible. A coordinated global effort in AI governance can help mitigate biases in AI models, standardize ethical guidelines, and create more inclusive AI applications that align with broader societal objectives.

By integrating these managerial and policy considerations, firms and governments can create a more resilient, innovative, and globally connected AI ecosystem.

Originality of the paper. *This study's contributions are threefold. Firstly, it introduces an international perspective into EE literature that traditionally views EE as isolated entities. We reveal the influence of global interconnectedness on the innovation potential of EE. Secondly, we underline the importance of innovation activities for the success of EE, bridging these two realms of literature. Thirdly, we delve into the intricate interplay of China's indigenous innovation and AI as a pivotal national technology, underscoring the ongoing significance of foreign knowledge in this developmental landscape.*

This study offers a novel contribution to the literature on entrepreneurial ecosystems by introducing an explicitly international perspective in a field that has traditionally focused on domestic dynamics. While most studies examine ecosystems as self-contained, localized structures, our findings underscore the critical role of global knowledge flows in shaping the innovation potential of AI-focused ecosystems. By integrating insights from international patent data, we reveal how foreign knowledge enhances the ability of Chinese firms to innovate, reinforcing the idea that regional ecosystems cannot be fully understood in isolation from global technological and scientific networks.

In addition to extending the entrepreneurial ecosystem literature, this study contributes to the broader debate on AI-driven innovation. AI, as a GPT, is inherently reliant on cross-disciplinary knowledge recombination, making international collaboration particularly valuable. While prior research has focused on China's domestic innovation policies and indigenous AI development, our study highlights the interplay between national strategies and foreign knowledge inflows, offering a more nuanced understanding of how China's AI ecosystem is shaped by external influences.

Furthermore, this research bridges the gap between entrepreneurial ecosystem studies and innovation policy scholarship, demonstrating that the strength of global embeddedness is not merely an ancillary factor but a fundamental determinant of ecosystem performance. By empirically testing the impact of foreign knowledge on firm-level innovation outcomes, we provide robust evidence supporting the importance of international openness, even in a policy environment increasingly focused on self-sufficiency.

Our study also sheds light on the broader geopolitical and economic implications of AI innovation in China. As global AI development becomes increasingly intertwined with industrial policy, trade regulations, and strategic competition, understanding the mechanisms through which foreign knowledge contributes to China's AI sector is of growing relevance to both scholars and policymakers. By demonstrating the tangible impact of international knowledge on firm-level AI innovation, enterprise value, and economic competitiveness, this study lays the foundation for future research on the role of global networks in shaping the next phase of AI-driven economic transformation.

By integrating these insights, this paper moves beyond static, localized conceptions of entrepreneurial ecosystems, instead presenting a dynamic, multi-level perspective that accounts for global knowledge flows, regional specialization, and competitive spillovers. This approach provides a more comprehensive framework for understanding how AI-driven innovation develops in different institutional and geopolitical contexts.

Key words: *artificial intelligence; China; knowledge flows; ecosystem*

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Generative Artificial Intelligence in the healthcare ecosystem: a game-changer for performance measurement

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Abstract

Healthcare systems function as interconnected ecosystems comprising several stakeholders, including hospitals, clinics, public institutions, and pharmaceutical companies. Effective inter-organizational collaboration enhances clinical outcomes, resource allocation, and knowledge sharing. However, growing complexity necessitates a shift toward an ecosystem perspective characterized by dynamic governance, interdependence, and shared value creation. In this evolving landscape, Performance Measurement Systems (PMSs) are crucial for aligning actors' interests and optimizing efficiency. Yet, traditional PMSs struggle to adapt to fast-changing digital environments, limiting their effectiveness in real-time performance evaluation. This study examines how Generative Artificial Intelligence (GenAI) influences performance measurement within healthcare ecosystems. Using an experimental approach, ChatGPT 4.0 was applied to assess healthcare performance in an Italian region, leveraging a Key Performance Indicator (KPI) dashboard focusing on care quality, resource utilization, and overall performance. ChatGPT was tested in generating performance insights, identifying patterns, and developing best practices to enhance decision-making. Preliminary findings suggest three key advantages of integrating GenAI into PMSs: (1) improved objectivity and accuracy in performance evaluation, (2) optimized decision-making through real-time data analysis, and (3) a more holistic assessment via human-AI collaboration. However, challenges remain, particularly regarding transparency, accountability, and the "black-box" effect in AI-driven decision-making. This research bridges a critical gap in AI-driven performance evaluation, contributing to both academic discourse and managerial practice. It underscores the need for institutional support and regulatory frameworks to ensure ethical and effective AI implementation. Ultimately, this study highlights the transformative potential of GenAI in shaping the future of healthcare ecosystems.

Framing of the research. *The literature has widely discussed inter-organizational networks (Haagedoorn, 1993; Hergert & Morris, 1988; Mowery, 1988). From an innovation creation standpoint, networks are characterised by their inherently temporary nature, linked to specific projects, varying from weeks to years (Keast et al., 2004; Provan & Huang, 2012). The need to coordinate care for patients with different needs (Palumbo et al., 2020) stimulated the spread of this organisational model in healthcare to 1) optimise clinical outcomes, 2) create evidence-based healthcare, 3) cost containment, 4) knowledge sharing, 5) ensure equity in access to care, and 6) resources optimising (Howard et al., 2008; Ferlie et al., 2010). The high complexity characterising the current competitive scenario has shifted toward an ecosystem perspective (Moore, 1993). Ecosystems do not have a standard definition, but the literature identified three main characteristics (Thomas & Autio, 2014): 1) a network of participants, 2) a governance system, and a shared logic. Indeed, contrary to inter-organizational networks, they have a decentralised, more fluid and dynamic governance structure, with informal and formal relationships and a strong orientation towards complementarity and interdependence (Thomas & Autio, 2020). Since the actors involved collaborate to realise a "central value proposition" (Adner, 2017), an ecosystem represents "an analytical lens that can be used to examine any network of actors consciously working together to create value" (Adner, 2006). Remarkably, the actors' heterogeneity in healthcare suggests considering healthcare networks as part of a broader ecosystem rather than an isolated phenomenon with only direct connections between nodes (Denicolai & Previtali, 2020). This is consistent with the value-based approach (Porter, 2006), where interaction and information exchange are key elements in value co-creation for patients and stakeholders.*

Despite the benefits of ecosystems, the interdependence of multiple actors can lead to a high risk of failure. This translates into the need to map and monitor ecosystems to improve efficiency and maximise value (Adner, 2006; Vainieri et al., 2020). Therefore, developing performance measurement systems (PMSs) is crucial to aligning employee behaviour with corporate goals (Yin & Qin, 2019; Nijp et al., 2016). This is especially relevant in healthcare ecosystems, where

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coordination and collaboration between actors driven by heterogeneous goals is crucial (Nuti et al., 2018). Evaluating performance within the healthcare ecosystem is challenging due to its multidimensional nature, stemming from the collaboration of different organisations and professionals (Barbazza et al., 2021). In the digital age, it is imperative to re-evaluate conventional performance measurement systems to align them with the dynamic nature of an environment characterised by constant technological advancements, organisational shifts, and process updates (Sahlin & Angelis, 2019; Yin & Qin, 2019; Kamble et al., 2020; Schiavone et al., 2022). In this context, digital technologies such as Artificial Intelligence (AI) further support performance evaluation by speeding up operations, identifying faster bottlenecks and improving overall efficiency (Akter et al., 2020). Thus, integrating AI in PMSs could represent a game-changer. It allows for a vast amount of real-time information and insights, enhancing the quality of decision-making (Lindebaum et al., 2020; Araujo et al., 2020; Buçinca et al., 2021; Kumar et al., 2022; Yu et al., 2018). Indeed, AI's ability to generate decision-support models from unstructured data can potentially improve our understanding of management and market dynamics (Martins et al., 2020).

Recent advances in AI opened the way to the development of Generative Artificial Intelligence (GenAI or GAI), a particular type of Artificial Intelligence system able to autonomously generate new, original content (Clune, 2019). Thus, "generative" refers to AI's ability to produce relevant content without explicit programming for each possible output (Cao et al., 2023). This revolutionary technology can boost progress, providing solutions and capabilities unimaginable (Dwivedi et al., 2023). From a performance measurement perspective, GenAI is a powerful tool. By leveraging large datasets and sophisticated algorithms, it analyses several data while minimising bias in evaluation processes (Rathnayake & Gunawardana, 2023). However, within the Industry 5.0 paradigm, it cannot replace human activities. The near-total automation of operations raises ethical and social concerns, including job displacement (Huang & Rust, 2018). Industry 5.0 instead promotes a resilient, human-centred approach, looking at digital technologies as a tool to foster human-machine synergy (Leng et al., 2022) and enable more personalised and sustainable processes (Rani et al., 2024).

Purpose of the paper. *GenAI can transform performance evaluation in healthcare by supporting clinical decision-making, streamlining administrative processes, and facilitating early diagnosis and treatment planning. However, GenAI is an augmentation tool that enhances professionals' capabilities rather than replacing human beings. Despite progress on this topic, the management literature still does not address the relationship between GenAI-driven performance measurement and healthcare ecosystem dynamics. Some authors define the antecedents of such performance (Floetgen et al., 2022), weights, metrics, and indicators (Acs et al., 2021; Guntupalli et al., 2021) or the relationship between the development of the digital ecosystem and its performance (Fernández-Portillo et al., 2024).*

Additionally, from a technological perspective, many authors addressed the technical characteristics of GenAI (Clune, 2019; Cao et al., 2023; Rathnayake & Gunawardana, 2023; Dwivedi et al., 2023), not focusing on its integration into business operations - e.g. performance evaluation. This research seeks to bridge this gap by investigating the effects of GenAI on performance measurement within healthcare ecosystems and answering the following research question: How does Generative AI influence performance measurement in the healthcare ecosystem?. To address this, the paper explores how GenAI tools can enhance the evaluation of healthcare by providing more accurate, real-time data that supports decision-making. The study further examines how these tools improve healthcare efficiency, optimise resource allocation, elevate care quality, and potentially reduce operational costs.

Methodology. *To tackle the research question, the authors practiced an experimental methodology using ChatGPT 4.0 as the main diffused GenAI tool to generate content. In doing so, the authors decided to simulate a case study of a research project on performance evaluation in an Italian healthcare ecosystem. Particularly, the project is focused on the development of a Key Performance Indicators (KPIs) dashboard to evaluate a healthcare ecosystem in South Italy. The dashboard is articulated in three main strategic areas: (1) Quality of care, (2) Resource utilisation and (3) Performance. To experiment and evaluate the potential of GenAI in augmenting human cognitive capabilities, one author implemented the dashboard to analyse data about the above-mentioned healthcare ecosystem. Simultaneously, a second author provided the dashboard and the dataset to ChatGPT. Considering the novelty of GenAI tools, authors followed the approach and protocol employed for similar research by Cervini et al. (2023). Particularly, the protocol suggests the different steps to be followed in dialogue with ChatGPT. To apply the protocol, the authors took the following actions:*

1. *They asked ChatGPT about the main performance measurement KPIs in healthcare.*
2. *They asked ChatGPT to measure the performance of the selected healthcare ecosystem based on a specific dataset and implement the project's dashboard.*
3. *They regenerate the questions to ChatGPT, varying the prompting with additional information, specifically considering the recommendation to improve critical KPIs of each strategic area.*
4. *They asked ChatGPT to develop best practices to improve the healthcare ecosystem's performance.*

To guarantee data triangulation (Yin, 2012), the authors identified several secondary sources of evidence, such as reports, statistical data, online documentation and archival records about the implementation of GenAI as a support for the healthcare ecosystem.

Expected Results. *The analysis will highlight the transformative power of GenAI in improving performance measurement within healthcare ecosystems. GenAI can boost how healthcare performance is measured by exploiting a vast amount of real-time data, improving the precision and efficiency of evaluation outcomes. Preliminary findings show that integrating GenAI in performance assessment systems provides three main advantages. First, it can significantly reduce bias in human data analysis, leading to more objective and reliable assessments. Second, it optimises decision-making by generating detailed, real-time insights that support the improvement of critical Key Performance Indicators*

(KPIs). Third, GenAI facilitates a holistic approach to performance measurement by fostering human-machine collaboration, ensuring a more comprehensive evaluation framework. However, preliminary findings highlight that its implementation is not without challenges. Addressing ethical concerns related to transparency, accountability, and trust in AI-driven recommendations is crucial. Indeed, there are several doubts about the quality and reliability of GenAI outputs generating potential black-box effects in healthcare decision support. Addressing these challenges is essential to fully harnessing the potential of GenAI in healthcare performance measurement.

Research limitations. *This study, while offering valuable insights, is not without its limitations. One of the key limitations is the focus on a single region in Italy, which may significantly affect the generalizability of the findings. Context-specific factors, such as the healthcare system's structure, cultural nuances, and regional policies, could lead to different outcomes in other regions or countries. As a result, these findings may not apply universally; therefore, future research should explore the application of GenAI in other geographical regions, comparing the results to identify regional differences and better understand the subtleties of applying this technology in diverse healthcare systems. Another limitation concerns the potential biases inherent in the dataset used for performance evaluation. Data-driven AI systems are susceptible to biases, which may affect the accuracy and reliability of the recommendations provided. This is particularly critical in healthcare, where the consequences of biased decisions can have significant ramifications. To improve the robustness of AI-driven performance evaluation, future research could explore methods for identifying and mitigating biases in healthcare datasets, including strategies for ensuring more representative and balanced data. Methodologically, the experimental approach used in this study may also pose limitations. The reliance on ChatGPT as the primary tool for data analysis and decision-making introduces the possibility of over-reliance on the technology's capabilities. Future research could explore more diverse methodologies, integrating human expertise alongside AI to develop a more hybrid approach to performance measurement. Additionally, external factors such as policy changes, technological advancements, and societal shifts could impact the applicability and relevance of this study's findings, making it crucial to continuously reassess the implications of these technologies in healthcare over time. Finally, the scarce availability of previous solid experiences about using GenAI to support healthcare performance evaluation could undermine the preliminary results' validity, laying the ground for future research. By acknowledging these limitations, future studies can build upon this research to provide more nuanced, scalable, and adaptable solutions for integrating GenAI into performance measurement systems across different healthcare ecosystems.*

Managerial implications. *This study provides valuable theoretical and practical implications for healthcare organizations, policymakers, and academic researchers. For healthcare managers, the findings suggest that GenAI can significantly enhance the effectiveness of performance measurement systems. By leveraging real-time data, GenAI can help optimize resource allocation, improve care quality, and reduce costs. However, its successful integration requires a shift in organizational mindset, as GenAI's potential needs to be recognized and supported by leadership. Managers will need to foster an environment that encourages technological adoption while balancing the human element in decision-making to ensure a human-centred approach is maintained. Moreover, the study highlights to policymakers the need for clear, structured guidelines to facilitate the adoption and implementation of GenAI in healthcare ecosystems. As this technology presents ethical and operational challenges, policymakers must create frameworks that address transparency, accountability, and trust issues. Additionally, they must ensure that GenAI integration aligns with broader healthcare goals, such as improving patient outcomes, equity in access, and cost-effectiveness. From a theoretical perspective, this research contributes to the academic debate on innovation management, technological change, and ecosystem dynamics in healthcare. It provides a foundation for further exploration of how GenAI influences performance measurement, offering new insights into its role in the healthcare ecosystem. The study encourages scholars to examine GenAI's impact from various angles, including its effects on inter-organizational collaboration, governance models, and decision-making processes. Future research should strive to find new and more versatile ways to adopt GenAI in healthcare organisations, as well as address the challenges regarding GenAI applications in other regions due to cultural differences.*

Originality of the paper. *The originality of this study lies in the new perspective it offers. While existing studies focused on the identification of tools for defining an adequate system for monitoring health performance, the present study aims to explore the role of GenAI in supporting and redefining performance measurement systems. Despite the digitalisation of healthcare being a prevailing reality, a significant lacuna exists within the body of knowledge. A review of several studies reveals a predominant focus on the adoption of AI as a tool for the real-time monitoring of patients' health status or as a support system in precision medicine, particularly in oncology and radiotherapy. This approach overlooks the potential for these tools to be employed for a more comprehensive monitoring purpose. The value of this research lies in the numerous managerial, theoretical and policy implications it offers. The findings of this study enable the identification of several opportunities to stimulate new theoretical investigations and to offer health managers the possibility of defining targeted and immediate strategic actions supported by the formulation of policies that facilitate their interventions. The analysis underscores the transformative role of a continuous monitoring system integrated with state-of-the-art digital tools. It is only through continuous evaluation of actions taken that healthcare that meets the needs of patients through increasingly personalised treatment can be guaranteed. Healthcare providers should perceive digitalisation and the vast control opportunities it offers as competitive levers rather than threats.*

Keywords: *Generative AI; Performance measurement; healthcare; ecosystem*

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Human-Based vs. AI-Based Diagnosis for Anamnesis Tertiarization: The Roles of Patients' Psychological Adaptation and e-healthcare Ethical Concern

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Abstract

Tertiarization can reshape healthcare services e.g., by redesigning preliminary anamnesis and diagnosis before specialist referral. In this study, trough an experimental research design, we examine the effects of AI-driven diagnostic tertiarization compared to human-led consultations. Findings interestingly show that AI-based diagnosis (vs. human-based diagnosis) enhances patients' intention to follow medical initial recommendations through psychological adaptation to technology. However, ethical concerns about e-health services moderate this effect, as higher concerns reduce psychological adaptation, weakening AI's positive impact. These results highlight the need to balance technological efficiency with ethical and psychological factors to foster AI acceptance in healthcare.

Keywords: *tertiarization; medical doctors; patients; healthcare; psychological adaptation; e-healthcare ethical concern; digital literacy*

Framing of the research. *The tertiarization of healthcare services has the potential to deeply modify the delivery of medical care, particularly by outsourcing initial diagnoses before specialist referral. In this paper, terziarization is this process of shifting toward AI-based technologies of processes that in the past were only internal to human-based organizations. Traditionally, general medical doctors, have played a gatekeeping role, conducting preliminary assessments before directing patients to specialists (Hitchcock et al., 2014; Tybjerg, 2023). However, advancements in healthcare tertiarization have led to the externalization of this diagnostic phase, optimizing patient flow and resource allocation (Berry et al., 2021; Taylor et al., 2013). This shift raises questions about the role of "non-traditional" diagnostic intermediaries, including artificial intelligence (AI)-driven systems, in facilitating medical decision-making (Sauerbrei et al., 2023).*

Recent technological advancements have enabled AI to perform initial diagnostic assessments (Jussupow et al., 2021), surgical decision making (Loftus et al., 2020), often through symptom-checker platforms where patients input symptoms, select affected body areas, and answer structured questions (see Wallace et al., 2022 for a detailed review. These AI tools, trained on vast medical datasets, generate preliminary diagnostic suggestions and specialist referrals, mirroring the function traditionally performed by human general practitioners (Shen et al., 2019). The increasing reliance on AI in this phase of healthcare delivery highlights the need to understand medical doctors' reactions to this technology (e.g., as in Irgang et al., 2025), and importantly individuals' psychological adaptation to new technologies, a concept that explains how individuals develop cognitive and emotional readiness to use and trust technological tools (Ronzhes et al., 2023). Psychological adaptation fosters a renewed intention to adopt technology-driven solutions, including following AI-generated recommendations in healthcare contexts (Muhammad et al., 2020; Sestino & Nasta, 2025).

Given this premise, two important research questions emerge: When anamnesis is outsourced, are AI-based diagnostic recommendations perceived as more or less acceptable than those from a human medical doctor? And importantly, how does psychological adaptation to technology influence this preference, and to what extent does ethical concern toward e-health services moderate this effect?

Recent literature suggests that patients and consumers are increasingly - and "already" - conscious of privacy risks associated with digital healthcare services (Duckert & Barkhuus, 2022; Scarpi et al., 2022). However, rather than privacy concerns alone, together with other important aspects e.g., maintaining non-verbal, emphatic communications and emotionality in the e-healthcare setting as well (e.g., as in Raman et al., 2016; Sestino & D'Angelo, 2023), a broader and more "convergent construct", i.e. the ethical concern, especially when dealing with AI, is gaining prominence (e.g., as explained in Ashok, 2022). Coherently, a recent studies by Verma, Kumar & Sharma (2021) begun conceptualizing e-healthcare ethical concern, as a key factor influencing trust, adoption, and compliance in AI-mediated healthcare.

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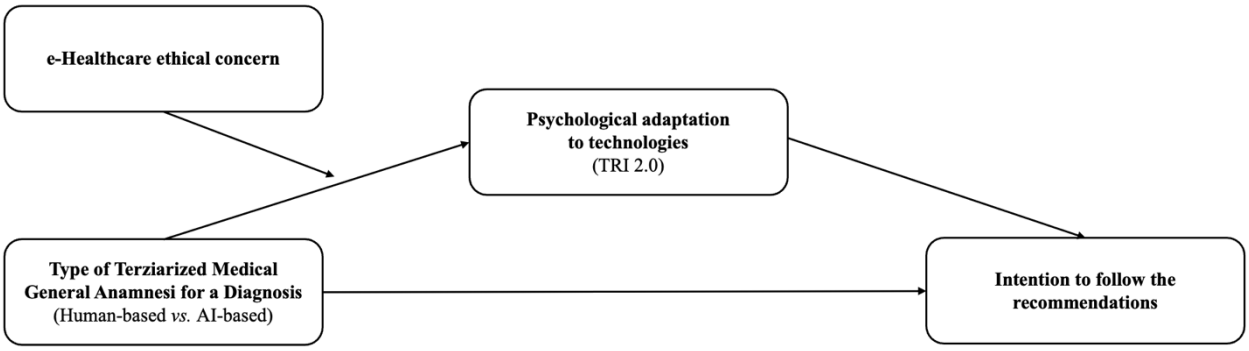
Understanding this construct's moderating role is essential for assessing the potential trade-offs between technological efficiency and ethical apprehensions in AI-based medical diagnostics.

Purpose of the paper. *The purpose of this paper is to investigate the effect of the Type of Tertiary Medical Diagnosis (Human-based vs. AI-based) on patients' intention to follow medical recommendations, while shedding light on two key psychological mechanisms: The mediating role of individuals' psychological adaptation to technology and the moderating role of e-healthcare ethical concern.*

Psychological adaptation to technology plays a central role in determining individuals' readiness to accept and integrate AI-driven diagnostic recommendations into their healthcare decision-making process. However, this adaptation is not uniform across individuals and can be significantly influenced by ethical concerns related to AI implementation in healthcare. E-healthcare ethical concern, which encompasses worries about transparency, fairness, accountability, and the potential erosion of human oversight, may shape how patients perceive and respond to AI-generated medical advice.

To operationalize psychological adaptation to technology, this study adopts the Technology Readiness Index 2.0 (TRI 2.0; Parasuaraman & Colby, 2015): The TRI 2.0 provides a well-established and multidimensional framework for assessing how individuals perceive and adapt to emerging technologies, particularly in contexts where technology substitutes human expertise. Importantly such as concept has been already widely employed in e-health settings (e.g., as in Kayser et al., 2019; Yosser et al., 2020). Unlike earlier iterations, TRI 2.0 integrates both technology enablers (optimism and innovativeness) and technology inhibitors (discomfort and insecurity), offering a perspective on patients' psychological responses to AI-based diagnostic tools (Parasuraman & Colby, 2015). This operationalization is particularly relevant in healthcare, where acceptance of AI-driven recommendations hinges not only on trust in technological efficiency but also on an individual's innate disposition toward technology adoption. By incorporating TRI 2.0, this study ensures a comprehensive and theoretically grounded measurement of psychological adaptation to technology in the context of AI-powered medical tertiarization (see Figure below).

Fig. 1: The proposed conceptual framework



Methodology. *Based on above, this study employs an experimental design to manipulate two conditions in a 2x2 between-subjects experiment. Participants were randomly assigned to one of two conditions, where they were exposed to a stimulus (scenario + image) describing either: 1) A consultation in which a human general practitioner (GP) conducted the initial diagnosis before specialist referral (Condition 1, coded "-1"); and 2) A consultation in which an AI-based system provided the initial diagnosis before referral to a specialist (Condition 2, coded "+1").*

Prior to exposure to the experimental condition, participants assessed their e-healthcare ethical concern, which was hypothesized as a moderator in the relationship between the type of tertiary medical diagnosis and intention to follow recommendations. The measurement items for e-healthcare ethical concern were drawn from Verma et al. (2021) (e.g., "E-health websites mention their purpose clearly", "E-health services follow ethical codes", "The interest of the consumer comes first", and so on).

After being exposed to their assigned condition, participants responded to items measuring their behavioral intention to follow the medical recommendation (Fishbein & Ajzen, 1977), followed by items assessing their psychological adaptation to technology, operationalized through the Technology Readiness Index 2.0 (TRI 2.0). The TRI 2.0 (Parasuraman & Colby, 2015) was used as it provides a comprehensive framework for capturing individuals' predisposition toward adopting technological solutions, integrating both positive (optimism, innovativeness) and negative (discomfort, insecurity; reversed for the further analysis) dimensions of technology readiness (e.g., ""New technologies contribute to a better quality of life", "Other people come to me for advice on new technologies", "Technical support lines could be helpful", "I feel confident doing business with a place that can only be reached online"). All the responses were assessed on a Likert scale ranging from 1 to 7, where 1= "Strongly disagree", and 7= "Strongly agree".

Finally, socio-demographic variables (e.g., age, gender, education, digital literacy, geographical location) were collected to account for potential covariates.

Results. *The final sample consisted in 170 participants (M_{age} = 36.34, SD_{age} = 10.15). Among the sample, 54% were male, and 46% female. As for the main analysis, confirming our predictions, results indicate that psychological adaptation plays a crucial mediating role in shaping the intention to follow AI-based recommendations, but this effect is moderated by ethical concerns. Formally the AI-based Type of Tertiaries Medical Diagnosis (vs. the human-based ones)*

positively influences the intention to follow the recommendations, because of individuals' psychological adaptation to technologies. When ethical concerns are low, AI recommendations enhance psychological adaptation, which in turn increases intention to follow recommendations. Conversely, when ethical concerns are high, AI recommendations are perceived as less psychologically adaptable, reducing their influence on intention. Precisely, the analysis was conducted using the Macro PROCESS Model 7 of SPSS (Hayes, 2009; 2018), to examine the moderated mediation effects of psychological adaptation to technology (Me) in the relationship between the Type of Tertiaries Medical Diagnosis (Human-based vs. AI-based) and individuals' intention to follow the recommendation (Y), with e-healthcare ethical concerns, acting as the moderator (Mo).

The first step of the analysis examined whether Type of Tertiaries Medical Diagnosis (Human-based vs. AI-based) influenced psychological adaptation. The model explained 42.99% of the variance in psychological adaptation ($R^2 = 0.4299$, $F(3,166) = 41.73$, $p < 0.001$). The direct effect of Type of Tertiaries Medical Diagnosis (Human-based vs. AI-based) on psychological adaptation was not significant ($\beta = 0.1946$, $p = 0.1082$), indicating that AI vs. human recommendations alone did not predict psychological adaptation: However, and more importantly, the interaction between Type of Tertiaries Medical Diagnosis (Human-based vs. AI-based) and e-healthcare concern, was significant ($\beta = -0.1495$, $p = 0.0194$), indicating a moderation effect.

Indeed, the conditional analysis revealed that when ethical concerns were low, AI-based recommendations were associated with higher psychological adaptation ($\beta = 0.4799$, $p = 0.0056$), indicating that individuals' with stronger psychological adaptation to new technologies (because of their readiness to new technologies) exhibit lower ethical concern toward e-healthcare. In contrast, and coherently, when ethical concerns were high, AI-based recommendations led to lower psychological adaptation ($\beta = -0.0907$, $p = 0.5955$), suggesting that users with strong ethical concerns may perceive AI-based recommendations as less reliable, continuing preferring the human ones.

Psychological adaptation had a significant positive effect on intention ($\beta = 0.4573$, $p < 0.001$), indicating that individuals who adapted well to the recommendation source were more likely to follow its advice. However, the direct effect of Type of Tertiaries Medical Diagnosis (Human-based vs. AI-based) on individuals' intentions to follow the recommendation, was not significant ($\beta = 0.1435$, $p = 0.3432$), suggesting that AI-based recommendations do not directly influence user intention, and thus, something different (i.e., psychological adaptation) explain the effect.

To examine whether the mediation effect of psychological adaptation to technology on intention to follow the recommendations, was conditional on e-healthcare ethical concerns, a moderated mediation analysis was conducted: The index of moderated mediation was significant ($\beta = -0.0684$, 95% CI [-0.1780, -0.0003]), confirming that the indirect effect of pe of Tertiaries Medical Diagnosis (Human-based vs. AI-based), on intention to follow the recommendation, through psychological adaptation varies depending on ethical concerns.

Indeed, the analysis of the conditional indirect effects showed that when ethical concerns were low, the indirect effect of the Tertiaries Medical Diagnosis (Human-based vs. AI-based) via psychological adaptation, was significant and positive ($\beta = 0.2195$, 95% CI [0.0118, 0.5454]), supporting a mediation effect. However, when ethical concerns were high, the indirect effect was not significant ($\beta = -0.0415$, 95% CI [-0.2105, 0.0834]), suggesting that the mediating role of psychological adaptation disappears in the presence of high ethical concerns.

Research limitations. *Despite its contributions, especially because it is at a preliminarily stage, this study is not exempt from limitations. First, some socio-demographic variables (e.g., the digital literacy) was treated as a covariate rather than a core explanatory variable. Since literacy levels are shaped by cultural contexts and healthcare system structures, future research should explore its moderating role in AI-based tertiarization acceptance, as patients with lower health literacy may react differently to AI-generated recommendations. Second, individual traits such as openness to innovation and technological affinity were not explicitly measured, though this was intentional, as these constructs are already embedded within TRI 2.0. Future studies could examine granular differences in technology readiness subdimensions, identifying which aspects of innovativeness or discomfort most strongly influence AI acceptance in medical tertiarization. Third, the study does not account for cross-cultural variations in ethical concerns, which may significantly shape AI adoption in healthcare. Ethical considerations surrounding privacy, algorithmic bias, and medical accountability vary across countries and regulatory environments, potentially influencing how AI tertiarization is perceived.*

Managerial implications. *On the basis of our results, from a managerial perspective, first, healthcare tertiarization strategies should integrate AI-powered diagnostic tools to enhance efficiency in patient triage and optimize specialist referrals. AI-driven anamnesis could reduce "bottlenecks" in general practice consultations, allowing medical doctors, to focus on complex cases, or to focus on a solid AI-based diagnosis for further medical analysis to be asked to the patients. Moreover, it could help manage queues in Emergency Rooms (e.g., as for in the case of First Aid), with initial screenings that are able to recognize symptoms and emergencies of different degrees and types, also making the healthcare service delivery process more efficient (with positive consequences, in reality, also at the policy level for national healthcare systems).*

Second, healthcare providers should invest in technological adaptation programs, ensuring that patients (and medical doctors) could develop a sufficient level of psychological readiness to trust AI-based recommendations. This requires structured communication strategies to reduce cognitive resistance and improve perceived reliability of AI diagnostics. Third, given the influence of ethical concerns on AI adoption, managers should develop transparency protocols and

ethical governance frameworks, ensuring that AI-based tertiarization is aligned with patient rights, regulatory compliance, and ethical medical standards, thus "alleviating" such a concern.

Nonetheless, from a marketing perspective, first, AI-driven healthcare services should be framed not as a replacement for human expertise but as an enhancement, positioning AI-based diagnostics as a supportive tool that complements medical professionals rather than competes with them. Second, marketing strategies should capitalize on psychological adaptation mechanisms, promoting familiarity through educational content, patient testimonials, and interface design that enhances usability and trust. Third, branding for AI-based healthcare solutions must explicitly address ethical concerns, emphasizing fairness, patient autonomy, and human oversight in decision-making. This would mitigate skepticism and improve adoption rates in digital healthcare ecosystems.

Originality of the paper. *This study provides a new perspective on the tertiarization of healthcare services, which has traditionally been examined through organizational outsourcing and service delegation rather than AI-driven diagnostic mediation. By empirically testing how patients psychologically adapt to AI-powered medical tertiarization (and precisely on AI-based vs. human-based prescreening and anamnesis), this research advances the understanding of how digital transformation is reshaping the patient-provider relationship. Focusing on the e-healthcare ethical concern as a moderating factor offers an original contribution, highlighting how patients' trust in AI-based diagnostics is not solely driven by technological efficiency (or as overcome, just privacy; Gutierrez et al., 2019), but mainly by broader ethical considerations especially when dealing with AI. Furthermore, by leveraging TRI 2.0 as a novel measurement model to sage individuals' psychological adaptation to new technologies, the study ensures a comprehensive and multidimensional assessment of such adaptation to AI, addressing a critical gap in digital healthcare research.*

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L'impresa del post-umano: il lato oscuro della transizione digitale nelle dinamiche aziendali

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Abstract
Il rapido progresso tecnologico degli ultimi anni ha posto le imprese di diversi settori di fronte ad un bivio: accogliere gli strumenti digitali all'interno dei propri processi operativi o rinunciare alla possibilità di essere competitive nel lungo periodo. Se da un lato la transizione digitale, in particolare con la diffusione dell'Intelligenza Artificiale, ha offerto tutta una serie di possibilità di innovazione e di sviluppo economico, dall'altro ha introdotto diversi rischi alle quali l'impresa tradizionale non era avvezza. Il presente studio ha l'obiettivo di analizzare le implicazioni di una eccessiva deresponsabilizzazione dell'essere umano ai diversi livelli aziendali, delimitando il confine tra l'impresa trans-umana - nella quale risorse umane e digitali convivono in armonia - e quella post-umana - nella quale le macchine prendono il sopravvento, escludendo l'essere umano da qualsiasi tipo di processo. Attraverso un'attenta analisi della letteratura di settore e l'utilizzo delle solide basi teoriche dell'Approccio Sistemico Vitale, il nostro studio si ripropone di offrire ai lettori diversi spunti di riflessione per il conseguimento di un modello di sviluppo aziendale socialmente sostenibile nell'era che stiamo vivendo, rimarcando il ruolo dell'essere umano come elemento di governance imprescindibile anche per le moderne imprese digitalizzate.

Inquadramento della ricerca. *Gli ultimi decenni hanno visto la società nella quale viviamo essere pervasa - in ogni suo aspetto - da uno sviluppo tecnologico progressivamente più rapido, che ha modificato radicalmente i modelli organizzativi ed operativi aziendali in qualsiasi settore (Calabrese et al., 2021). A partire dall'ambito delle telecomunicazioni, l'avvento di Internet e la diffusione del World Wide Web ha rivoluzionato il modo in cui le informazioni vengono scambiate e condivise a livello globale, segnando un cambiamento epocale anche nelle abitudini e nello stile di vita della popolazione mondiale.*

Lo sviluppo delle piattaforme digitali e dei dispositivi mobili, prima, e dell'Intelligenza Artificiale (IA), poi, hanno avuto un impatto decisivo sul settore dei servizi - con la nascita dell'e-commerce - e, soprattutto grazie ai social media, dell'intrattenimento; a seguire l'ambito sanitario, finanziario e dell'educazione hanno subito forti influssi legati alla trasformazione in atto. Nel campo industriale (Brown, 2019), infine, la transizione digitale ha portato alla diffusione della cosiddetta 'Industria 4.0', caratterizzata dalla ricerca di nuove strategie di gestione basate sull'automazione dei processi - principalmente attraverso l'utilizza dell'IA e dell'Internet of Things (IoT).

Lo scenario appena descritto impone a qualunque attività che ambisca ad essere competitiva dal punto di vista economico ed al passo con i tempi, un adeguamento che sia il più rapido possibile. Per questo motivo, nell'ottica di sopravvivenza delle imprese, oggi la digitalizzazione non rappresenta più un'opzione, bensì una necessità.

Volendo reinterpretare l'integrazione del digitale nei processi aziendali da un punto di vista filosofico, si potrebbe parlare dell'impresa moderna come di una 'impresa trans-umana'. Tale concetto - riprendendo la definizione comunemente accettata di trans-umanesimo - indica una realtà nella quale la tecnologia agisce a supporto della capacità umana, migliorando la produttività attraverso l'automatizzazione dei processi operativi e supportando i decisori umani nelle scelte strategiche (Goleman, 1998), *e nella gestione delle risorse. L'impresa trans-umana così definita porta con sé un'accezione dichiaratamente positiva, legata alla visione del progresso tecnologico come un motore di crescita per le imprese. Come sottolineano Caputo e Saviano (2020), la co-evoluzione tra risorse umane e tecnologie abilitanti rappresenta un elemento cardine per favorire lo sviluppo sostenibile dei sistemi di servizio, rafforzando il ruolo dell'impresa come piattaforma relazionale orientata alla co-creazione di valore. D'altronde, l'introduzione di strumenti innovativi nelle logiche di gestione ha, storicamente, sempre portato ad un miglioramento dell'efficienza dei processi operativi - offrendo opportunità di innovazione e migliorando la competitività.*

La stessa sostenibilità, obiettivo prioritario delle aziende di ogni settore, sembrerebbe trarre grande beneficio dalla co-operazione di risorse umane e tecnologiche nell'impresa trans-umana, senza prescindere dal valore relazionale generabile all'interno delle organizzazioni (Barile et al., 2021) Se dal punto di vista della tutela ambientale, infatti, l'ottimizzazione dei processi produttivi e della logistica potrebbe ridurre considerevolmente l'impatto sul nostro pianeta,

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dal punto di vista economico nuovi processi di business e di gestione delle risorse potrebbero apportare notevoli benefici. L'integrazione degli strumenti digitali nei processi operativi porterebbe, inoltre - rimanendo nella narrazione ipotetica di un'impresa trans-umana perfettamente sviluppata - a ridurre l'esposizione umana ad attività pericolose, ripetitive o usuranti ed a garantire una migliore flessibilità lavorativa ai dipendenti.
Purtroppo, come spesso accade, non è tutto oro ciò che luccica: se da un lato, IA e IoT hanno fornito strumenti innovativi in grado di ottimizzare i processi operativi attraverso l'automazione di compiti nei quali la figura umana non era indispensabile, dall'altro hanno causato una riorganizzazione radicale delle strategie d'impresa e dei modelli di gestione che vedono una parziale esclusione della matrice umana rispetto alle dinamiche aziendali (Barile S., 2008; Barile S., 2023). Da questo punto di vista, la digitalizzazione delle imprese presenta un grande limite legato alla progressiva deresponsabilizzazione delle risorse umane che rischia di generare - a lungo andare - un modello non socialmente sostenibile.

La sensazione di alienazione dovuta ad un'eccessiva intrusione della tecnologia nei processi operativi è esacerbata da un diffuso senso di diffidenza nei confronti del digitale e dall'avversione - tipica della nostra natura - al rapido cambiamento. La preoccupazione principale è che l'IA possa prendere il sopravvento, escludendo la componente umana da qualsiasi tipo di pianificazione (Bassano et al., 2024).

Il rischio concreto è che l'idilliaco modello trans-umano di impresa ceda il posto ad una configurazione di tipo post-umano, nella quale l'elemento tecnologico assume pieno potere decisionale ed operativo. La deriva post-umana porterebbe ad uno scenario critico, nel quale l'essere umano non avrebbe più alcun controllo reale sui processi aziendali - talvolta anche in maniera tristemente inconsapevole - e sarebbe relegato al ruolo di spettatore.

Scopo del lavoro. *Quale che sia la natura dell'impresa - a prescindere dal settore di interesse e/o dal livello di integrazione tecnologica - ha come obiettivo principe la creazione di valore (Barile, 2009). Laddove la connessione tra le risorse umane e la forza lavoro digitale riesca a favorire un ambiente operativo nel quale i processi possano essere semplificati da una strategia in grado di ottimizzarli, la creazione di valore diventa il risultato spontaneo di una pianificazione adeguata (Calabrese et al., 2024; Saviano et al., 2017).*

La parola chiave per il successo economico di un'azienda è, in buona sostanza, la pianificazione - ovvero la scelta di una strategia operativa in grado di sfruttare le risorse a disposizione in maniera ottimale, di adeguare i processi ai risultati attesi e di generare un vantaggio competitivo sostenibile nel tempo (Porter, 1980). La capacità di un'impresa di gestire le fasi operative in maniera coerente con gli obiettivi prefissati non può, dunque, prescindere da un organo decisionale in grado di selezionare le strategie aziendali più appropriate) a seconda delle dinamiche contestuali (Panati & Golinelli, 1991).

Se la creazione di valore non può essere perseguita in assenza di un organo decisionale in grado di orientare il corretto funzionamento dell'impresa, bisogna ragionare sulla possibilità che, con l'avvento di tecnologie 'pensanti' basate sull'IA, tale ruolo - da sempre riservato all'essere umano - possa essere acquisito dalle macchine. Il dubbio appena sollevato rappresenta la vera linea di confine tra un'impresa trans-umana, nella quale le risorse tecnologiche - adeguatamente integrate nei processi operativi aziendali - altro non sono che strumenti al servizio del decisore umano, e quella post-umana, nella quale l'impresa automatizzata ha il potere di autogestirsi (Williams & Davis, 2020) - estromettendo l'essere umano da qualsivoglia logica decisionale.

Lo scopo del nostro lavoro è, dunque, quello di entrare nel merito della questione, esaminando gli ostacoli allo sviluppo di un modello aziendale sostenibile dal punto di vista sociale ed analizzando - con spirito critico rispetto alla minaccia concreta di una eccessiva deresponsabilizzazione dell'essere umano - le ripercussioni che il superamento di tale confine possa avere sui diversi attori aziendali coinvolti nella transizione digitale.

Oltre a valutare tutte le possibili conseguenze di una digitalizzazione eccessiva e di una deresponsabilizzazione, tale per cui la figura umana diventi completamente irrilevante rispetto ai processi decisionali, il nostro lavoro vuole trasmettere anche un messaggio positivo, basato sulla ferma convinzione che l'impresa - almeno per come la intendiamo oggi e l'abbiamo concepita in passato - non possa arrendersi alle logiche del post-umanesimo. Tale pensiero, che - come verrà chiarito nella sezione successiva - deriva dall'utilizzo dell'Approccio Sistemico Vitale (aSv) per l'analisi dello scenario descritto, è legato all'impossibilità di inquadrare l'impresa in un'ottica sistemica in assenza di un elemento umano al governo dei processi. D'altronde, parafrasando Daft, la complessità che caratterizza i processi aziendali è intrinsecamente legata alla natura (umana) delle decisioni che li determinano (Daft, 2005).

In definitiva, secondo la nostra prospettiva, l'impresa trans-umana - nella quale le tecnologie digitali agiscono a supporto dei processi - consentirebbe di preservare un livello di sostenibilità che, per tutta una serie di motivi che ci riproponiamo di esporre nel prosieguo, verrebbe meno una volta oltrepassato il confine che porta al post-umano.

Approccio metodologico. *Il concetto di sopravvivenza di un'attività economica nell'era digitale - come già accennato in precedenza - è strettamente connesso alla necessità di un adattamento dinamico alle nuove esigenze introdotte dalla tecnologia. In altre parole, un'impresa che, al variare del contesto operativo di riferimento, non sia in grado di riorganizzare i propri processi per incontrare le richieste dei consumatori o gestire in modo accurato le proprie risorse rischia di veder venir meno la propria capacità di generare valore - vanificando, di fatto, la sua stessa esistenza.*

Un'affermazione di questo tipo diventa di facile interpretazione se consideriamo il pensiero di Von Bertallanfy, secondo il quale l'impresa può essere pensata alla stregua di un sistema aperto, caratterizzato da una costante e continua interazione tra le sue componenti strutturali ed il contesto esterno nel quale essa si trova ad agire (Von Bertalanffy, 1968). Adottando una prospettiva basata sull'aSv, la riflessione diventa ancora più profonda: l'impresa come 'sistema vitale' necessita di un continuo cambiamento mirato al mantenimento dell'equilibrio con gli elementi che caratterizzano

l'ambiente operativo nella ricerca di un maggior livello di consonanza con i sovrasistemi (Barile, 2008) che essa considera rilevanti (Barile S., 2024). Per questo motivo, l'introduzione di nuovi strumenti digitali varia necessariamente la configurazione complessiva dell'ambiente, modificando le priorità del sistema - imposte dai sovrasistemi rilevanti - e costringendo l'organo decisore dell'impresa a prendere provvedimenti, sia dal punto di vista strutturale che processuale.

L'inquadramento teorico dell'impresa in ottica sistemico-vitale rappresenta l'elemento chiave alla base dell'approccio metodologico scelto per il conseguimento degli obiettivi che il nostro lavoro intende portare a termine. Come già anticipato nella sezione relativa agli scopi dello studio, l'aSv rappresenta lo strumento attraverso il quale verrà analizzata l'influenza negativa della digitalizzazione spinta sulla responsabilità sociale degli stakeholders e saranno vagliate le conseguenze del rischio - oramai sempre più concreto - di un'impresa del post-umano (Barile, 2023). In linea con questa prospettiva, Caputo e Saviano (2019) ampliano il framework dell'aSv sottolineando come, nei contesti complessi e digitalizzati, la sopravvivenza dei sistemi impresa dipenda dalla capacità di armonizzare l'evoluzione tecnologica con la dimensione cognitivo-relazionale degli attori coinvolti. Tale visione sistemica consente di leggere l'impresa come un ecosistema intelligente in cui la tecnologia non può sostituire la centralità dell'essere umano, ma deve agire in sinergia con esso per garantire sostenibilità e valore nel tempo.

Lo studio affronta, dunque, la tematica della Responsabilità Sociale d'Impresa (CSR) attraverso una nuova prospettiva: a differenza di numerose pubblicazioni scientifiche di settore, nelle quali vengono analizzati casi studio o proposte strategie per l'integrazione delle nuove tecnologie informatiche nel rispetto dei principi di sostenibilità, il nostro lavoro si concentra nel mettere in evidenza le problematiche della transizione digitale, demarcando i limiti da non superare se si vogliono evitare ripercussioni.

D'altronde, una strategia di CSR all'avanguardia dovrebbe focalizzarsi sulla ricerca di pratiche volte a tutelare i lavoratori non solo da un punto di vista legale ed etico, ma anche rispetto al loro ruolo attivo all'interno dell'azienda (Paniccia, 2018) - soprattutto in una prospettiva knowledge sharing interna alle organizzazioni e di responsabilità e di diritto di partecipazione ai processi decisionali (Iandolo et al., 2021). Risulta, pertanto, impensabile considerare esclusivamente i benefici del digitale, trascurando la possibilità che una 'deumanizzazione' dei processi possa causare degli effetti negativi sul materiale umano che compone i diversi livelli dell'impresa.

All'atto pratico, il nostro studio si basa su un'attenta analisi della letteratura che consente - dopo aver esaminato scenari concreti di comunicazione tra mondo umano e mondo digitale nel contesto imprenditoriale - di concettualizzare i potenziali effetti negative (Lerner et al., 2015) della transizione digitale in ottica sistemico-vitale, esplicitando i motivi per cui un'impresa trans-umana risulti ancora perfettamente sostenibile, purché l'elemento umano mantenga il proprio ruolo di controllo sui processi decisionali.

Focalizzandosi su quelli che Freeman definisce 'stakeholder primari' (Freeman, 1984), il nostro lavoro propone, dunque, un approccio metodologico basato su un'analisi multilivello, attraverso la quale vengono valutati gli effetti della digitalizzazione su tre figure chiave:

- *Il decisore: rappresentato dagli organi di governance, responsabili dell'orientamento strategico dell'impresa, della gestione e dell'implementazione dei processi operativi.*
- *Il dipendente: colui che prende parte ai processi in maniera attiva, pur subendo le decisioni in maniera passiva.*
- *Il consumatore: colui che determina il cambiamento delle priorità aziendali, agendo direttamente sul contesto operativo esterno all'organizzazione.*

Risultati. *La minaccia del post-umanesimo rappresenta uno scenario distopico, ma al tempo stesso più vicino alla realtà di quanto comunemente percepito. In ambito scientifico, diversi studi si concentrano sui limiti etici di una digitalizzazione spinta - in relazione, soprattutto, alla problematica della privacy informatica e della condivisione dei dati - trascurando le implicazioni legate al processo di deumanizzazione delle imprese (Richards & King, 2014; Floridi, 2016). Altri lavori si ricollegano, invece, alla richiesta di nuove figure lavorative in possesso di competenze digitali avanzate, prendendo in considerazione soltanto una piccola parte del problema. Ciononostante, seppur evidenziando una cognizione del pericolo limitata ad aspetti specifici, l'analisi condotta in letteratura, ha permesso di legittimare l'ipotesi iniziale, secondo la quale alle grandi opportunità di crescita e di innovazione offerte dalla transizione digitale si contrappongono diversi rischi - in termini di alienazione e deresponsabilizzazione del capitale umano - per la sostenibilità sociale delle imprese (Vito et al., 2021).*

Una volta inquadrata la posizione della comunità scientifica - e delle aziende stesse - rispetto alla tematica in analisi, l'aSv ci ha permesso di reinterpretare l'impresa in un'ottica sistemica e di formalizzare in maniera più adeguata le problematiche che affliggono il sistema in ogni sua parte. In particolare, come esposto nella sezione precedente, lo studio si è concentrato sulle tre categorie di stakeholder - organi decisionali, dipendenti e consumatori - ritenute essere le più colpite.

I risultati emersi vengono riassunti di seguito, esponendo le implicazioni per ciascuna delle tre classi di interesse in maniera separata:

- *Impatto sui decisori: molte considerazioni sull'importanza dell'elemento decisionale all'interno di un'organizzazione aziendale sono già emerse, implicitamente, nelle sezioni precedenti. Facendo riferimento, infatti, ad uno dei cinque postulati fondamentali del pensiero sistemico - il 'principio di sopravvivenza' -, la sopravvivenza di un sistema vitale è espressa dalla sua capacità di modificare i propri processi interni in relazione alle esigenze del momento, dettate dai sovrasistemi esterni. Risulta, pertanto, molto difficile immaginare un sistema vitale - sia esso un'impresa, o*

qualsiasi altra organizzazione - in assenza di un organo decisionale in grado di assicurare la possibilità di pianificazione necessaria.
Chiarita l'imprescindibilità dell'organo decisionale rispetto all'esistenza stessa dell'impresa come sistema vitale, bisogna riflettere sulla possibilità e sulle implicazioni che tale ruolo - nella descrizione di uno scenario post-umano - venga assunto dall'IA. La domanda da porsi, dunque, è se un decisore di tipo digitale possa in qualche modo sopperire alla mancanza dell'elemento umano - e provvedere in egual misura alla sopravvivenza del sistema - oppure la completa deumanizzazione rappresenti il punto di non ritorno che porterà alla scomparsa delle imprese per come siamo abituati a concepirle.
La risposta, fornita ancora una volta dall'aSv, prende in considerazione le modalità attraverso le quali le scelte vengono effettuate; bisogna fare riferimento al 'Modello della Varietà Informativa' (Barile S., 2024), secondo il quale ogni decisione deriva dalla capacità dell'organo di governance di raccogliere le informazioni a sua disposizione e di riutilizzarle sulla base di schemi interpretativi derivanti dalle cosiddette 'categorie valoriali' - l'insieme di valori e credenze forti che descrivono, in maniera innata, la personalità del decisore. Nel framework appena descritto non va, poi, trascurato il ruolo delle emozioni, le quali - come l'esperienza comune suggerisce - facilitano o ostacolano le scelte a seconda delle situazioni (Damasio, 1994).
La complessità decisionale della gestione di impresa viene, in sintesi, a dipendere da fattori valoriali ed emozionali tipicamente umani. Ipotizzare che una macchina possa riuscire ad operare delle scelte, attraverso la modalità appena esposta, significherebbe aprirsi alla possibilità che l'IA sviluppi una propria coscienza e che dal ruolo di mero 'attuatore' assuma una capacità decisionale che - almeno per il momento - non le si addice.

- *Impatto sui dipendenti: l'introduzione massiva di strumenti digitali all'interno dei processi operativi aziendali modifica profondamente il ruolo dei dipendenti, i quali sono costretti ad aggiornarsi rapidamente onde evitare l'obsolescenza della loro funzione. Essi, per via della loro posizione strategica che risente sia delle dinamiche interne sia degli input e delle decisioni provenienti dall'alto, risultano, probabilmente, essere i soggetti tra tutti più vulnerabili alla transizione digitale.*
  Il rischio più concreto è quello di un progressivo spostamento delle competenze operative verso il mondo digitale che, oltre ad influire sugli aspetti legati alla precarietà lavorativa ed alla necessità di riqualifica delle competenze, potrebbe generare un significativo disagio psicologico - meno evidente, ma altrettanto preoccupante - legato alla riduzione dell'autonomia decisionale (già piuttosto limitata) della classe operaia. In altre parole, il benessere sociale e lavorativo di un dipendente del sistema aziendale è vincolato alla possibilità di sentirsi parte attiva dei processi, pur non potendoli determinare in maniera diretta. Diversi casi studio su aziende di successo, non a caso, mostrano l'esistenza di una relazione diretta tra il grado di coinvolgimento emotivo - e di partecipazione attiva dei dipendenti ai processi operativi - e la capacità dell'impresa di creare valore (Calabrese et al., 2024).Un concetto molto caro all'aSv, in tal senso, quello di 'appartenenza': con l'avvicinarsi allo scenario delle imprese post-umane, il rischio per i dipendenti è che - ammesso che riescano a conservare la propria posizione lavorativa all'interno dell'azienda (Goleman, 1998) - prendano sempre meno parte ai processi, finendo per perdere il proprio senso di appartenenza.
- *Impatto sui consumatori: i consumatori, pur rappresentando una stakeholder esterna e non partecipando attivamente ad alcun tipo di processo aziendale, hanno - paradossalmente - un ruolo decisionale molto maggiore rispetto a quello dei dipendenti. Questo assunto può essere meglio chiarito inquadrando il ruolo del consumatore nella descrizione del 'sistema impresa' offerta dall'aSv: dal momento che coloro che usufruiscono dei servizi sono gli utenti finali dell'intero processo produttivo, è evidente che l'interesse dell'azienda sia, in ogni momento, quello di soddisfare le esigenze del cliente. Ecco che, al variare delle richieste e delle necessità dei consumatori, si modificano anche le priorità dell'impresa; quest'ultima, in quanto sistema, vede nelle esigenze dei consumatori un sovrasistema rilevante al quale adeguarsi per legittimare la propria sopravvivenza.*
  Da un punto di vista sistemico, dunque, i consumatori influenzano le scelte aziendali attraverso l'esplicitazione dei loro bisogni - che rappresentano i sovrasistemi rilevanti ai quali la governance di impresa deve adeguare i processi. È evidente, viste le premesse, che, in un'ottica di prosperità e di sostenibilità a lungo termine di un'impresa, la comunicazione tra azienda e cliente debba essere sempre ottimale - al fine di garantire una comprensione immediata delle esigenze dei consumatori.
  Anche in questo caso, la chiave del successo è legata ad un fattore emotivo, ovvero alla capacità dell'impresa di instaurare nel consumatore un senso di fiducia, una sorta di empatia che lo porti ad affezionarsi al brand - riconoscendo in esso la capacità di comprendere le proprie esigenze. Tutto ciò rischia di venir meno - e già sta accadendo con la diffusione, sempre maggiore, delle piattaforme di online-shopping - nel momento in cui il servizio clienti viene affidato a strumenti basati sull'IA (chatbot, ad esempio) non in grado di mostrare la minima empatia nell'interfacciarsi con i consumatori.

Limiti della ricerca. *La nostra ricerca, attraverso una visione critica ed in qualche modo volutamente provocatoria, si focalizza sui lati negativi della transizione digitale nelle imprese e sui rischi - spesso improvvidamente sottovalutati - di una eccessiva automatizzazione (deumanizzazione) dei processi e delle risorse aziendali. Nonostante l'approccio utilizzato - basato sull'analisi della letteratura e sulla reinterpretazione in chiave sistemica della problematica in esame - possa essere ritenuto di per sé esaustivo per il conseguimento degli obiettivi di studio preposti, la trattazione potrebbe beneficiare di indagini quantitative o della valutazione di un set di casi studio più ampio a supporto della tesi. Quest'ultima - che ci riserviamo per studi futuri che esulano dagli obiettivi del presente lavoro - potrebbe consentire di offrire una visione più dettagliata sulla percezione della problematica del post-umano a livello aziendale e di individuare*

delle best practice che consentano di preservare la componente umana ed emozionale nella gestione d'impresa, evitando una deriva pericolosa.

I diversi spunti e le numerose implicazioni manageriali emerse dai risultati dello studio permettono di scavare a fondo tra i diversi livelli che compongono la struttura delle imprese, analizzando i diversi aspetti - legati all'incalzante progresso tecnologico - che ne minacciano l'equilibrio. Sicuramente, per quanto la nostra ricerca abbia provato ad offrire una visione d'insieme, alcuni fattori sono stati trascurati in favore di altri, considerati più centrali rispetto allo studio. Non si è approfondito in maniera adeguata, ad esempio, sulle differenze strutturali e sistemiche tra le imprese di diversi settori. Uno spunto per un prossimo lavoro potrebbe essere, in tal senso, legato ad uno studio comparativo, volto a valutare le implicazioni della transizione digitale su settori differenti.

Infine, considerato l'elevato tasso di evoluzione tecnologica, sarebbe importante - restando nell'ottica della sostenibilità sociale - considerare anche variabili di tipo etico e/o normativo e valutare se - e con quali modalità - le imprese riescono a stare al passo. Questioni legate alla privacy ed alla sicurezza dei dati, ad esempio, meriterebbero sicuramente maggiore attenzione, sebbene la letteratura di settore sia costellata di lavori che trattano di queste tematiche.

Implicazioni manageriali. *Le implicazioni manageriali della nostra ricerca sono molteplici e, in gran parte, sono emerse in maniera spontanea - coerentemente al flusso narrativo - nel corso della trattazione. Senz'altro lo spunto di riflessione più immediato è legato al confine sottile tra il progresso dell'impresa trans-umana e la deriva di quella post-umana. I risultati della ricerca, a tal proposito, evidenziano la presenza di rischi concreti per la sostenibilità sociale a lungo termine che si oppongono alle opportunità di crescita economica promesse dagli strumenti digitali.*

La necessità di bilanciare innovazione tecnologica e capitale umano rappresenta, dunque, la prima - e più importante - implicazione manageriale. Diversi studi hanno, infatti, dimostrato come la scarsa integrazione e la non adeguata comunicazione tra risorse umane e digitali siano state la principale causa di fallimento delle strategie aziendali negli ultimi anni (Brown, 2019). Lo stesso Goleman, promotore dell'intelligenza emotiva, conveniva - molti anni prima dell'era del digitale - sul fatto che la componente umana della governance fosse l'elemento decisivo per il successo di un'impresa, ancor più degli strumenti utilizzati all'atto pratico nello svolgimento dei processi (Goleman, 1998).

Altra importante implicazione palesata dal nostro lavoro è legata al concetto di sostenibilità - più in particolare di CSR. Si fa presente, a tal proposito, come la maggior parte degli studi manageriali, nell'analizzare le diverse problematiche legate alla responsabilità d'impresa, si soffermino esclusivamente sugli aspetti più evidenti - tutela economica ed ambientale, ad esempio - trascurando i fattori psicologici delle risorse umane, che influenzano le dinamiche aziendali dall'interno. Anche nel discutere di sostenibilità sociale nello specifico, le preoccupazioni principali - in relazione alla transizione digitale - restano banalmente ancorate agli evidenti rischi di alienazione lavorativa e di scarsa protezione della privacy. Come evidenziato a più riprese, sarebbe altrettanto importante sottolineare gli aspetti sociali legati al senso di appartenenza, di responsabilità decisionale e/o operativa e di benessere psicologico del personale - oberati dalla pressione imposta dal confronto con una realtà digitale (Barbagallo, 2012) che viene percepita come una minaccia dagli addetti ai lavori.

In buona sostanza, tutte le dinamiche di interazione fra le parti che compongono l'impresa continuano a basarsi su criteri di tipo emozionale. Tale asserzione è conseguenza diretta della natura delle decisioni in ambito aziendale, che - secondo il modello della varietà informativa, citato in precedenza - non possono prescindere da una matrice valoriali che tenga in considerazione i tratti tipicamente umani (inclusa la componente emozionale) degli organi di governance. Questo discorso ci conduce ad un'altra implicazione fondamentale emersa dal nostro studio: non è possibile concepire l'impresa, così come siamo abituati a conoscerla, in assenza di un decisore umano che ne gestisca i processi.

Il messaggio di speranza, in questo senso, è forte e chiaro: l'impresa del trans-umano può essere realizzata soltanto trovando un equilibrio tra le risorse operative umane e quelle digitali - tale da non ledere lo spirito di appartenenza ed il benessere psicologico dei dipendenti -, a condizione che il ruolo decisionale e di pianificazione rimanga saldamente prerogativa dell'essere umano.

Ultima, ma non per importanza, è una considerazione relativa all'influenza di ciascuna parte del 'sistema impresa' sugli altri elementi che lo compongono. Ci riferiamo, ad esempio, al fatto che la deumanizzazione dell'impresa a livello di governance - ovvero la sostituzione dei decisori umani con ipotetici strumenti di IA in grado di prendere decisioni - causerebbe indirettamente conseguenze sui dipendenti, i quali in assenza di una persona fisica con la quale dialogare ai 'piani alti' non avrebbero modo di contestare gli ordini impartiti o di avere chiarimenti in merito ad indicazioni poco chiare; allo stesso modo, la sostituzione degli addetti all'assistenza clienti con modelli di IA generativa sarebbe fonte di malcontento per la classe dei consumatori, stanchi di interfacciarsi con un interlocutore privo di empatia e incapace di comprendere le loro esigenze (Goleman, 1998) . Di conseguenza, oltre all'imprescindibilità del fattore umano a livello decisionale, è fondamentale - per evitare il tragico scenario del post-umanesimo - che le tecnologie digitali siano implementate nei processi aziendali a supporto delle risorse umane e non in loro vece.

Originalità del lavoro. *L'originalità della nostra ricerca è stata evidenziata, a più riprese, in relazione agli obiettivi prefissati ed alle modalità di indagine selezionate. Nella fattispecie, l'argomento della sostenibilità sociale delle imprese nell'era digitale è stato affrontato attraverso un punto di vista diverso, mirato all'analisi delle controindicazioni piuttosto che dei benefici. La scelta di un simile approccio è derivata dalla tendenza, osservata in altri studi di settore, a saltare direttamente alle conclusioni, proponendo delle soluzioni e delle strategie implementative senza aver prima acquisito sufficiente consapevolezza della problematica da affrontare.*

L'obiettivo del nostro studio, pertanto, è stato quello di descrivere le principali implicazioni negative di un modello aziendale digitalizzato che - seppur riconoscendone l'importanza ed il valore aggiunto rispetto alle imprese tradizionali - presenta tutta una serie di rischi legati alla perdita di centralità dell'essere umano nei processi decisionali ed operativi.

Altro aspetto distintivo del lavoro, a testimonianza della sua originalità, è il contributo offerto dall'aSv e dalla possibilità di inquadrare le dinamiche aziendali di interazione tra umano e digitale in una prospettiva sistemica (La Sala et al., (2023). L'analisi multilivello dell'impatto tecnologico sui diversi attori in gioco - decisori, dipendenti e consumatori - e la disamina sul ruolo delle emozioni nei processi decisionali forniscono implicazioni manageriali concrete e spunti di riflessione per la promozione di una cultura organizzativa responsabile e sostenibile nel lungo periodo (Barile et al., 2013). La stessa prospettiva del CSR è stata affrontata attraverso un punto di vista differente, focalizzato sul ruolo del dipendente umano come parte integrante del sistema aziendale e non come semplice esecutore dei processi stabiliti. Da qui il concetto di appartenenza e di benessere psicologico basato sull'empatia tra le parti, troppo spesso dimenticati o sottovalutati quando si parla di responsabilità sociale.

Infine, la definizione di uno scenario post-umano - in contrapposizione al modello trans-umano di azienda sostenibile - rappresenta uno stimolo a riflettere e a valutare le controindicazioni di ogni situazione, prima di lasciarsi accecare dai possibili benefici. La scelta di preferire, dunque, un approccio di tipo critico - rivolto all'esplorazione delle problematiche, piuttosto che all'individuazione di possibili soluzioni - vuole essere anche uno stimolo per la comunità scientifica, invitata a contribuire al tema attraverso una diversa prospettiva.

Key words: *sostenibilità; responsabilità sociale d'impresa; approccio sistemico vitale; transizione digitale; gestione d'impresa; processi aziendali.*

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The Intelligence Gap: Merging Explainable AI with Managerial Perception for Proactive Crisis Strategy

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Abstract

The increasing complexity of corporate environments necessitates a shift from reactive crisis management to proactive, AI-enhanced strategic foresight. While AI-driven predictive models have demonstrated strong accuracy in identifying financial distress, their integration into executive decision-making remains a challenge. This study bridges the intelligence gap between algorithmic precision and managerial intuition by leveraging Explainable AI (XAI) to make crisis prediction models interpretable and actionable. Using a balanced dataset of 3,000 firms, the research compares multiple innovative models, demonstrating that AI can detect latent vulnerabilities often overlooked by traditional financial analysis. Furthermore, XAI enhances transparency, allowing managers to contextualize financial risks and governance inefficiencies. The findings emphasize that AI should complement, and not replace, human decision-making, determining a shift toward intelligence-driven business resilience. However, the study also highlights limitations related to managerial AI literacy and the reluctance to adopt predictive analytics as a decision-support tool. Finally, by embedding AI within strategic workflows, this study advances both academic discourse and managerial practice, positioning AI as a transformative force in crisis anticipation and long-term corporate sustainability.

Framing of the research. *Traditionally, corporate distress has been conceptualized through reactive frameworks, where financial and managerial interventions occur only after signs of distress become apparent (Beaver, 1966; Altman, 1968). However, contemporary advancements in artificial intelligence (AI) and predictive analytics have introduced the possibility of proactive crisis anticipation, allowing firms to detect financial and operational vulnerabilities before they materialize into systemic failures (Davenport & Ronanki, 2018; Zhang et al., 2021). A clear distinction must be drawn between corporate crisis and insolvency, as these concepts entail fundamentally different implications for firms, regulators, and stakeholders. A corporate crisis refers to a situation of operational or financial distress that may impair a company's efficiency, profitability, or market positioning but does not necessarily lead to legal bankruptcy proceedings (Mitroff, 2005). In contrast, insolvency is a legally defined condition in which a company is unable to meet its financial obligations, leading to restructuring or liquidation under insolvency frameworks (Altman, 1993; Ferri, 2022).*

The regulatory approach to these conditions varies significantly across jurisdictions. For instance, in the United States, Chapter 11 bankruptcy protection enables firms to undergo structured reorganization, preserving business continuity while renegotiating debt. In contrast, the European approach tends to emphasize early warning mechanisms and preventive restructuring, as seen in the EU Directive 2019/1023, which encourages firms to identify and address distress before insolvency proceedings become necessary (Eidenmüller & van Zwieten, 2015). These differences reflect a broader evolution in corporate governance and financial regulation: rather than focusing solely on post-crisis intervention, contemporary frameworks increasingly emphasize early detection, transparency, and proactive strategic planning (Bellovary et al., 2007; lo Conte et al., 2024). This shift is driven by growing recognition that financial distress affects not only the firm itself but also a broader network of stakeholders, including investors, creditors, employees, and supply chain partners (Mitroff, 2005; Floridi et al., 2018).

Predictive AI in Crisis Detection: Advancing Beyond Traditional Models

Historically, crisis prediction relied on financial ratio analysis and econometric models, beginning with Beaver's (1966) univariate analysis and evolving through Altman's (1968) Z-Score model, which introduced a multivariate approach to bankruptcy prediction. While these models have been widely used in academia and practice, their limitations are evident: they assume linear relationships among variables, rely on historical financial data, and fail to capture dynamic, nonlinear interactions between corporate performance indicators (Ferri, 2022; Aydin et al., 2022). In response, AI and machine learning (ML) techniques have emerged as superior alternatives, offering the ability to process high-dimensional datasets, detect complex patterns, and adapt to changing business environments (McKee, 1995; Vinuesa et

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al., 2020). Recent studies have demonstrated that ensemble models such as Random Forest, Gradient Boosting, and XGBoost significantly outperform traditional econometric models in predicting financial distress (Zhang & Susheng, 2021), and these models are particularly effective for firms across different scales and sectors:

- *Multinational Corporations (MNCs): AI-powered financial distress models enable global firms to integrate cross-border risk assessments, taking into account currency fluctuations, geopolitical risks, and macroeconomic indicators (Lin et al., 2020);*
- *Mid-sized enterprises: AI models facilitate sector-specific crisis detection by incorporating industry-specific variables such as supply chain disruptions, regulatory compliance risks, and consumer sentiment analysis (Ribeiro et al., 2016);*
- *Small enterprises: For smaller firms, AI-driven early warning systems can enhance access to alternative financing mechanisms, enabling businesses to restructure proactively rather than default (Floridi et al., 2018).*

Bridging the Intelligence Gap: Explainability as a Strategic Imperative

While AI offers unparalleled predictive accuracy, a critical challenge remains: how do managers interpret and act upon AI-generated insights? Firstly, a major limitation of AI adoption in crisis management is the lack of explainability and interpretability, commonly referred to as the "black box" problem (lo Cont et al., 2024). Decision-makers, in fact, often struggle to understand why an AI model predicts financial distress, leading to skepticism and reluctance to integrate AI-driven insights into strategic decision-making. To address this, recent research has focused on explainable AI (XAI) techniques, which enhance transparency by providing human-interpretable explanations of AI outputs (Molnar, 2022). Among these techniques, SHapley Additive exPlanations (SHAP) has emerged as a leading method for AI explainability in financial analysis (Lundberg & Lee, 2017; Fasano et al., 2024). SHAP, in fact, allows managers to identify which factors most influence a firm's financial health, making AI predictions actionable and facilitating a shift from reactive problem-solving to proactive strategic foresight (Thiebes et al., 2020). Furthermore, by integrating AI-based interpretability into crisis models, businesses can move beyond raw predictions and develop a nuanced understanding of the underlying causes of distress. In fact:

- *AI can reveal operational bottlenecks, suboptimal capital structures, and governance weaknesses that may not be evident through traditional financial analysis;*
- *Unlike rigid statistical models, AI-driven crisis detection can be tailored to sector-specific financial characteristics, ensuring greater relevance and accuracy (Nguyen et al., 2019);*
- *AI-enhanced explainability enables firms to communicate financial risks effectively to stakeholders, fostering trust and collective action in crisis management (Russell & Norvig, 2021).*

The adoption of AI-driven foresight then could represent not merely a technological evolution but a fundamental shift in corporate mindset. Traditional approaches to crisis management have been reactive, with firms responding to distress only after it manifests. However, proactive crisis anticipation necessitates a paradigm shift where enterprises integrate AI not just as a diagnostic tool, but as an interactive decision-support system (Barboza et al., 2017). This study contributes to the literature by advancing an integrated AI-human decision framework that places organizations at the center of a stakeholder-driven ecosystem. By embedding understandable, transparent AI insights into strategic foresight processes, businesses, in fact, can preemptively address financial distress, optimize resource allocation, and enhance long-term stability (Addo et al., 2018). Given these considerations, the paper first outlines the research objectives, focusing on explainable AI for proactive crisis detection. It then details the research design, including dataset selection and machine learning model implementation. The empirical findings highlight model accuracy and key financial indicators, followed by a discussion of data limitations and challenges in integrating AI-driven insights. The paper then explores practical applications in decision-making during critical situations, concluding with its contribution to bridging AI precision and executive judgment for strategic foresight.

Purpose of the paper. *Recent advancements in XAI offer transformative managerial approaches, shifting crisis anticipation from post-factum intervention to predictive, evidence-based foresight (Davenport & Ronanki, 2018; Fasano et al., 2024). However, despite the growing application of AI in financial risk assessment, a significant gap persists in integrating XAI into executive decision-making, limiting its impact at the strategic level. This gap reflects a broader challenge within the academic discourse: while the literature on corporate crisis prediction is inherently interdisciplinary, drawing from fields such as finance, econometrics, artificial intelligence, and operational research, managerial perspectives remain underdeveloped. Most existing studies focus heavily on statistical performance and algorithmic refinement rather than on how executives can leverage AI-driven insights for strategic decision-making (Jiang et al., 2020; Zhang & Susheng, 2021). This has resulted in a disconnect between research and real-world business practice, where AI models, despite their predictive accuracy, often remain detached from executive decision-making processes due to lack of interpretability, transparency, and integration into managerial workflows (Russell & Norvig, 2021). This paper addresses this issue by investigating the following Research Question:*

- *RQ: How can AI-driven predictions bridge the gap between virtual data insights and executive decision-making for early crisis detection and strategic action?*

This study then contributes to the academic debate by shifting the focus from purely technical AI advancements to their strategic application in corporate foresight and crisis management. First, it extends prior research by embedding XAI within the broader domain of crisis detection and executive decision-making, demonstrating how explainability tools enhance managerial comprehension of early warning signals (Floridi et al., 2018; Fasano et al., 2024). While previous

studies have consistently shown that machine learning models such as Random Forest, XGBoost, and Gradient Boosting outperform traditional statistical methods in financial distress prediction (Jiang et al., 2020), fewer have explored how to make these models more interpretable, actionable, and trustable for corporate leaders (Ribeiro et al., 2016). Second, this paper challenges the prevailing deterministic, one-size-fits-all approach to financial distress modeling, advocating for context-sensitive AI frameworks that consider firm-specific characteristics, industry constraints, and governance structures (Nguyen et al., 2019). Unlike standardized risk models, which often reduce crisis detection to fixed financial thresholds and static variables, this study proposes an adaptive approach that customizes AI models to different organizational settings, ensuring greater alignment with real-world managerial needs (Mitroff, 2005). Third, this research underscores the growing importance of AI-human collaboration in high-stakes decision-making. Businesses do not operate in isolation but within interconnected stakeholder ecosystems, where crisis signals must be interpreted not only in financial terms but also in relation to organizational resilience, investor sentiment, and market positioning (Lin et al., 2020).

By embedding XAI into a stakeholder-inclusive crisis response model, this paper advocates for a shift from reactive crisis management to anticipatory decision-making, prioritizing transparency, shared intelligence, and collaborative problem-solving. Ultimately, this study contributes to bridging the divide between AI-driven foresight and executive judgment, demonstrating how XAI can enhance managerial confidence, facilitate strategic intervention, and redefine crisis management as an anticipatory discipline rather than a reactive necessity. So, by integrating quantitative AI modeling with qualitative insights into decision-making behavior, this paper enriches the scholarly debate on AI-human collaboration in business strategy, providing a foundation for future research in predictive analytics, digital transformation, and enterprise risk governance.

Methodology. *This paper follows an inductive research approach, allowing insights to emerge from empirical observations rather than being constrained by predefined theoretical assumptions (Tharenou et al., 2007). Given the relationship between financial performance, governance structures, and crisis anticipation, a data-driven methodology is necessary to bridge the intelligence gap between AI-driven predictions and managerial decision-making. The research is ongoing, with previous findings already published, and it continues to evolve as new insights emerge. In this context, the empirical analysis is based on a balanced dataset of 3,000 Italian firms, extracted from the AIDA database by Bureau van Dijk. The Italian business environment, in fact, provides a unique and challenging case for crisis prediction, characterized by a high concentration of SMEs, complex governance structures, and evolving regulatory frameworks for insolvency resolution (Fasano et al., 2024).*

The dataset includes both firms in financial distress, identified based on negative equity, recurring losses, high debt ratios, and formal restructuring procedures, and firms with stable financial performance and no crisis signals. The balanced nature of the dataset is fundamental, ensuring that AI models do not become biased toward distressed firms while maintaining high generalizability and real-world applicability (lo Conte et al., 2024). To develop a multi-dimensional crisis prediction model, we consider 65 key indicators spanning economic-financial metrics, governance structures, and market-related factors. The economic and financial variables include liquidity ratios, profitability metrics such as EBITDA, ROE, and ROA, leverage levels, cash flow stability, working capital efficiency, and Altman Z-Score components. Governance and structural factors account for board composition, the number of executive representatives, ownership concentration, CEO tenure, shareholder dispersion, and legal form classifications. Market and operational metrics capture industry-specific sensitivities, revenue growth trends, investment intensity, and supplier/customer concentration (Tison, 2020). The inclusion of a broad spectrum of indicators ensures a high-resolution predictive framework and enhances the early detection capabilities of AI-driven models (Jiang et al., 2020). Furthermore, the comprehensive nature of the dataset strengthens the robustness of AI models, while the diverse set of variables allows for a granular understanding of financial distress drivers.

To critically assess AI's effectiveness in corporate crisis anticipation, we implement a comparative framework that evaluates multiple algorithms in terms of predictive accuracy, interpretability, and managerial applicability (Agarwal & Tafler, 2008). Rather than treating models as isolated technical tools, they are structured as components of an AI-driven Balanced Scorecard for crisis management, designed to facilitate their practical integration into corporate decision-making processes. The machine learning models deployed include Logistic Regression, serving as a benchmark for traditional econometric approaches; Gradient Boosting Machines (GBM), refining predictive granularity through sequential optimization; and XGBoost, a high-precision boosting technique that optimizes recall for crisis prediction. Model performance is assessed using classification metrics such as F1-score, accuracy, and precision-recall AUC, ensuring a balanced evaluation of predictive capabilities and the trade-offs between false positives and false negatives (Breiman, 2001; Lundberg & Lee, 2017). To prevent overfitting and enhance model robustness, we employ 10-fold cross-validation, ensuring that predictions remain reliable across different firm profiles (Zhang & Susheng, 2021).

A fundamental component of this study is explainability, ensuring that AI models serve as decision-support systems rather than black-box predictors. The integration of explainable AI techniques addresses the intelligence gap by making predictions more interpretable and actionable for decision-makers.

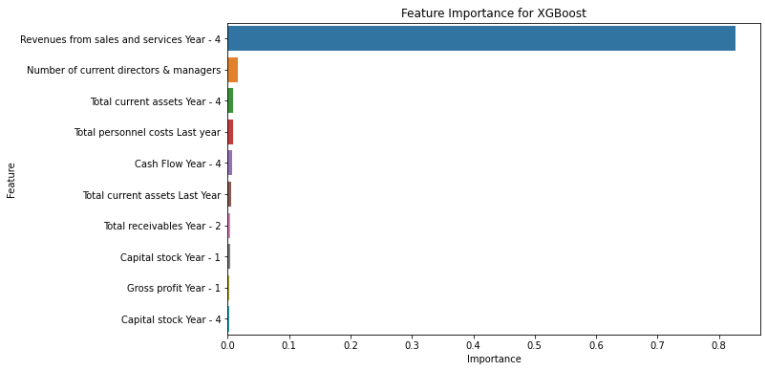
SHAP provides a transparent breakdown of AI-generated crisis predictions, identifying key financial, governance, and operational drivers of distress (Fasano et al., 2024). By bridging the gap between algorithmic complexity and executive decision-making, SHAP enables firms to move beyond passive risk assessment to proactive strategic planning. Furthermore, Partial Dependence Plots (PDPs) visualize non-linear relationships between firm-specific factors and

crisis probability, offering sector-specific insights that make AI-driven forecasts more actionable. These interpretability tools ensure that predictive models are accurate but also tailored to industry-specific crisis dynamics, enhancing their real-world applicability (Tison, 2020). Moreover, counterfactual explanations contextualize crisis risk, suggesting alternative strategic scenarios to mitigate financial distress. Together, these explainability techniques transform AI from a statistical tool into an executive decision-support system, making predictions more accessible, actionable, and industry-adaptive. As AI-driven foresight advances, in fact, sector-specific explainability models will further close the gap between data insights and real-world strategic execution, reinforcing AI's role as a key enabler of corporate crisis management and business resilience.

Results. *The empirical findings confirm the dual role of AI in crisis prediction and strategic crisis management, demonstrating both its predictive accuracy and its value in early alert systems for proactive intervention. Among the machine learning models tested, XGBoost emerged as the most effective, achieving an overall accuracy of 81%, outperforming Logistic Regression (68%), and Gradient Boosting (77%). This reinforces the superiority of ensemble learning techniques in identifying firms at risk of financial distress while maintaining generalizability across different corporate structures. In particular, XGBoost model correctly identified 83% of distressed firms (recall), with a precision of 78%, ensuring a balanced approach between reducing false negatives (missed crises) and mitigating false positives (over-predictions of distress). Notably, the false negative rate remained at 17%, significantly lowering the risk of failing to detect an impending crisis. However, an analysis of false positives reveals an important insight: in many cases, firms flagged as "at risk" by the model but not currently in distress displayed early warning signs that traditional financial assessments failed to capture. These firms often exhibited subtle governance inefficiencies, declining operational margins, or unsustainable leverage ratios that may signal financial instability before it becomes critical. So, the results suggest that false positives should not be dismissed as model errors but rather examined as potential early warning signals of latent vulnerabilities (lo Conte et al., 2024). In many cases, in fact, firms flagged incorrectly as distressed later showed declining financial health in subsequent periods, confirming the model's ability to anticipate distress before conventional indicators reveal it. This underscores the importance of shifting from a reactive approach to crisis management, where intervention occurs after financial distress is evident, to a proactive approach that leverages AI for early detection and mitigation strategies.*

Figure 1 presents a SHAP summary plot for the best performing algorithm, illustrating the impact of key financial, governance, and operational variables on the AI model's crisis predictions. The horizontal axis represents the SHAP values, indicating whether a given feature increases or decreases the likelihood of financial distress. Variables positioned further from zero have a stronger influence on the prediction outcome. Notably, revenues from sales and services (Year -4) and the number of current directors & managers emerge as the most significant predictors, reinforcing the idea that early financial signals and governance structures play a crucial role in crisis detection. Additionally, leverage, production costs, and receivables management appear as critical indicators, aligning with traditional financial distress theories.

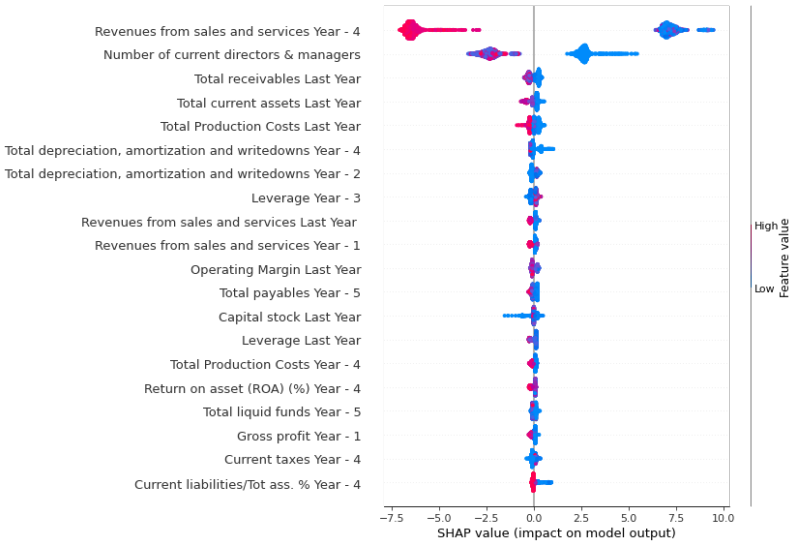
Fig. 1: Feature Importance Plot



Source: our processing

This visualization emphasizes the capacity of AI-driven models to act as early alert systems, identifying potential crisis risks in different areas of the business well before conventional financial ratios reflect distress. So, by leveraging XAI techniques, managers can interpret and act upon these insights proactively, strengthening financial resilience and decision-making processes. Figure 2, on the other side, provides a SHAP summary plot, offering a perspective on the most influential variables in predicting financial distress. This visualization bridges the intelligence gap between raw machine learning outputs and managerial intuition, making AI-driven forecasts interpretable and actionable. The horizontal axis represents the impact of each variable on the model's predictions, while the color gradient (red to blue) indicates whether higher values of a given feature increase (red) or decrease (blue) the likelihood of financial distress.

Fig. 2: SHAP Summary Plot



Source: our processing

Three key variables stand out as critical early warning signals:

- *Revenues from Sales and Services (Year -4): as expected, declining revenues over time (blue) signal financial instability, while stable or growing revenues (red) reduce the likelihood of distress. This reinforces the idea that early sales performance is a strong predictor of long-term financial health, often preceding shifts in cash flow and profitability;*
- *Number of Current Directors & Managers: a decrease in the number of directors and managers is associated with higher crisis probability. This suggests that governance inefficiencies, leadership conflicts, or excessive business structuring could be warning signs of instability. Conversely, stable governance structures indicate financial resilience;*
- *Leverage (Year -3) - The model identifies leverage as a double-edged sword: while moderate leverage (blue) supports business expansion, excessive debt accumulation (red) increases financial distress risks. This underscores the importance of balance between financial leverage and operational stability.*

This XAI-powered analysis transforms AI from a "black box" into a transparent decision-support tool, allowing businesses to not only detect crisis risks early but also understand the underlying factors driving predictions. The color contrast metaphor acts as a financial traffic light for executives, guiding them toward proactive strategic interventions rather than reactive crisis responses. In conclusion, the findings of this study emphasize that AI should be viewed as an enabler rather than a substitute for managerial decision-making. While AI-driven models, particularly XGBoost, demonstrate remarkable accuracy in predicting financial distress, their true value lies in how effectively human decision-makers can interpret and act upon these insights. Without proper contextualization, even the most sophisticated AI models remain abstract data points. The integration of AI into corporate decision-making must therefore be accompanied by a paradigm shift that incentivates AI literacy, encourages stakeholder collaboration, and embeds machine intelligence within business strategy rather than treating it as a standalone analytical tool.

A major challenge certainly remains bridging the technical gap between algorithmic outputs and managerial intuition, as AI does not replace human expertise but enhances it by providing structured, data-driven early warnings that allow firms to act before crises escalate. This is particularly relevant for SMEs, where digital fluency and AI-driven decision-making need to be cultivated to ensure that AI insights are not only available but also understood, trusted, and utilized effectively. So, to be truly effective, AI adoption must be tailored to industry-specific needs and organizational structures, much like the Balanced Scorecard framework, which aligns data-driven performance metrics with strategic goals. A hybrid approach, where AI automates routine financial monitoring while enhancing human-led interventions, could ensure that predictive insights are both actionable and adaptable to the unique dynamics of each enterprise. Furthermore, by embedding AI into corporate structures in a flexible, transparent, and explainable manner, businesses can shift from reactive crisis management to proactive strategic foresight, strengthening financial sustainability and stakeholder confidence. Ultimately, AI should not be perceived as a disruptive force but as a tool for empowerment, creating a corporate culture where data-driven insights and human expertise coexist to drive more informed, strategic, and resilient decision-making.

Research limitations *While this study provides valuable insights into AI-driven crisis prediction and strategic intervention, certain limitations must be acknowledged. The research is ongoing, meaning that some constraints will be addressed in future developments. Interestingly, the most significant challenges do not stem from AI itself but from managerial mindsets and organizational inertia: despite AI's increasing presence across industries, many firms still*

struggle to integrate it effectively into decision-making processes. The real limitation lies in the willingness to understand, trust, and apply AI-driven insights, rather than in the technology's capabilities. AI is no longer an abstract concept, it is an embedded force in modern business environments. So, the key is not resisting it but learning how to use it ethically, strategically, and efficiently. Future research will focus on expanding AI adaptability to different business contexts, refining XAI frameworks for even greater interpretability, and ensuring alignment with ethical AI principles. The goal is not just to develop more accurate models, but to help creating a managerial culture that embraces AI as a trusted, proactive tool for business sustainability and crisis prevention and management.

Managerial implications. *This study underscores the urgent necessity of embedding AI into strategic decision-making rather than treating it as an external or auxiliary tool. The real challenge is no longer whether AI can predict crises, it can, but whether businesses are prepared to adopt and integrate it meaningfully into their governance and operational frameworks. For managers, this research demonstrates that AI-driven early warning systems must transition from experimental tools to institutionalized frameworks, ensuring real-time risk assessment and proactive crisis prevention. AI literacy is no longer optional, as executives must develop the ability to interpret and leverage AI-driven insights just as they do financial reports, ensuring that data-driven decision-making becomes a cornerstone of corporate strategy rather than an isolated analytical function. Moreover, AI models must be customized and industry-specific, ensuring that their predictions align with sector-specific financial dynamics, governance structures, and risk factors, rather than being applied as one-size-fits-all solutions.*

From an academic perspective, this study bridges a crucial gap between AI precision and managerial intuition, offering a pragmatic approach that blends predictive analytics with human-centered decision-making. While AI has seen extensive application in financial modeling, many frameworks remain detached from real-world business needs, focusing excessively on statistical accuracy rather than managerial applicability. By emphasizing Explainable AI techniques and practical integration strategies, this research advances the discourse on AI adoption in corporate crisis management.

Originality of the paper. *This study redefines the role of AI in corporate crisis management, shifting the narrative from mere prediction to strategic empowerment. While existing literature largely focuses on financial distress modeling through statistical methods or black-box machine learning approaches, this research takes a bold step forward, demonstrating that AI is a catalyst for a new era of decision-making. The paper introduces a groundbreaking fusion of AI precision and managerial intuition, tackling the intelligence gap that has long hindered AI's real-world applicability. By integrating XAI methodologies, we transform AI from a distant, technical function into an intuitive, business-driven decision-support system, allowing executives to see, understand, and act on AI-driven insights rather than passively receiving abstract predictions. What sets this study apart is its focus on the intersection of AI, managerial cognition, and strategic action: it does not merely seek to enhance the accuracy of financial distress prediction models, but rather to reimagine how businesses interact with AI-driven foresight, moving from a reactive, crisis-driven approach to a proactive, intelligence-led business culture. In conclusion, by embedding AI insights seamlessly into corporate structures, much like a financial dashboard or a Balanced Scorecard, this research charts a path toward a future where AI is not feared, but embraced, where it does not replace human decision-making but enhances it. In doing so, it offers a blueprint for the future of AI in business strategy: transparent, explainable, and deeply intertwined with the human expertise that remains irreplaceable.*

Key words: *AI-driven crisis prediction; Explainable AI; early warning systems; decision-making; machine learning.*

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Stakeholder Engagement and Social Sustainability Practices in Innovative Italian SMEs: The Mediating Role of Artificial Intelligence

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Abstract

This study aims to examine how stakeholder engagement shapes social sustainability in innovative Italian SMEs, highlighting the mediating role of Artificial Intelligence (AI). Drawing on Ajzen's extended Theory of Planned Behavior and stakeholder theory, it proposes that higher levels of stakeholder engagement foster stronger intentions to adopt socially responsible practices, ultimately yielding more effective social outcomes. The research further posits that AI tools-encompassing chatbots, predictive analytics, and big data-reinforce the transition from intention to action by enabling proactive communication and personalized stakeholder interactions. A cross-sectional survey of 2,273 innovative SMEs identified through the Italian Chamber of Commerce will capture stakeholder engagement measures, AI capabilities, and social sustainability practices. Structural Equation Modeling (SEM) will test the proposed relationships, controlling for firm-level attributes such as size, financial performance, and age. The findings will show how AI-driven capacities and robust stakeholder engagement foster social sustainability, offering practical insights for managers and policymakers.

Key words: *social sustainability, stakeholder engagement, artificial intelligence, SEM, SMEs, TPB*

Framing of the research. *Stakeholder engagement has emerged as a cornerstone of modern organizational strategies (Hristov & Appolloni, 2022; Kujala et al., 2022), reflecting a shift from shareholder-centric models toward more inclusive approaches that prioritize dialogue with a diverse range of stakeholders (Freeman, 1984; Donaldson & Preston, 1995; Greenwood, 2007; Freeman et al., 2007; Bhandari et al., 2022; Van Buren et al., 2025).*

Stakeholder engagement is the systematic involvement of individuals, groups, or institutions affected by an organization's decisions, to foster mutual value creation (Freeman, 1984; Bridoux et al., 2022). This perspective asserts that businesses must consider the interests of all stakeholders-including employees, customers, communities, and investors-to achieve long-term success.

From this perspective, stakeholder theory-widely recognized by scholars for its inherently managerial nature-plays a crucial role when integrated with environmental (E), social (S), and governance (G) criteria (Attanasio et al., 2022). These ESG factors have become fundamental benchmarks for assessing corporate sustainability, driven by regulatory pressures, investor demands, and societal expectations (Friede et al., 2015). This paradigm underscores the importance of the relational approach between firms and their stakeholders as key determinants of the success of corporate sustainability strategies (Schaltegger et al., 2019; Kujala et al., 2022; Sady, 2023). Several recent studies have highlighted how Artificial Intelligence can enhance stakeholder engagement (Zhang & Yang, 2024), catalysing firms' ability to proactively respond to stakeholder needs and reducing information asymmetries (Rane et al., 2024). Specifically, Zhang and Yang (2024) emphasize that companies integrating Artificial Intelligence tools into managing their social sustainability practices can respond more swiftly to external pressures, positively impacting overall sustainability.

Furthermore, Artificial Intelligence's ability to identify patterns and correlations between corporate actions and stakeholder perceptions enables the development of more targeted and effective strategies. This process is recognized as a critical factor in improving the social sustainability practices of innovative Italian SMEs, with Artificial Intelligence emerging as a significant mediator in this context. As supported by various studies (Camagni & Capello, 1998; Sabatini et al., 2022; Dainelli et al., 2024) innovative small and medium-sized enterprises (SMEs) in Italy are a key resource for the Italian industrial fabric, standing out for their ability to adapt to global challenges and generate technological and innovative solutions in high-growth sectors.

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The literature highlights that effective stakeholder engagement in innovative Italian SMEs fosters trust, aligns strategic objectives with societal needs, and drives sustainability outcomes (Winkler et al., 2019; She et al., 2023; Esposito et al., 2025).

Through active stakeholder engagement, supported by artificial intelligence's mediating role, businesses and organizations can facilitate shared knowledge creation, promote sustainable practices, and stimulate strategic innovation (Eccles et al., 2013; Eccles & Klimenko, 2019).

From this perspective, firms must manage interactions with stakeholders, which can be conducted at varying levels of engagement. Gao and Zhang (2006) highlight that this process unfolds in four stages, where the key variables are the level of commitment and the number of stakeholders involved (Figure 1):

1. Stakeholders are merely given information (passive state);

2. Stakeholders are consulted (listening state);

3. Stakeholders engage in dialogue with company (two-way process);

4. Management is driven by stakeholders (proactive state).

Figure 1 - The level of stakeholder engagement and number of direct participants

Level of engagement	Stakeholders are merely given information (passive)	Stakeholders are consulted (listening)	Stakeholders engage in dialogue with company (two-way process)	Management is driven by stakeholder (proactive)
Stakeholder engagement approach	Inform stakeholders via public media Publish reports Policy and product documents	Listen to stakeholders through formal meetings or suggestion boxes Hear stakeholders' views through questionnaires and interviews Have a complaint process	Hold focus group discussions Provide feedback to stakeholders Use stakeholder-driven performance measures and reports	Set up a stakeholder council Allow stakeholder representatives in management Ask for stakeholder verification of social report
Number of stakeholder participants	Mass stakeholders and wide society	Selected stakeholders	Limited number of key stakeholders	Very limited number of key stakeholder (e.g. stakeholder representatives)

Source: Gao and Zhang, 2006, p. 727.

In the transition from the "two-way process", where stakeholders engage in dialogue with the company-though limited to a select group of critical voices-to the "proactive state", where the number of stakeholders is highly restricted to key representatives who guide management, Artificial Intelligence can play a crucial role as a mediator in this transition process.

Purpose of the paper. *In this regard, the present study aims to explore the relationship between stakeholder engagement and social sustainability practices in innovative SMEs, focusing on the mediating role of artificial intelligence. Specifically, AI-based technologies, such as chatbots, predictive analytics, big data, and sentiment analysis, allow management to align with stakeholder expectations proactively. These tools enable the anticipation of needs, real-time feedback collection, and predicting future trends or emerging issues (Joshi, 2024). Consequently, innovative technologies facilitate more timely and effective engagement, allowing companies to fully align with stakeholders and build trust-based relationships grounded in proactivity rather than mere reactivity.*

Furthermore, artificial intelligence has the potential to personalize communication according to the specific needs and preferences of stakeholders (Bosse et al., 2023). In this perspective, organizations' digital capabilities in proactively and continuously engaging all internal and external stakeholders are essential for adequately implementing social sustainability practices (Buonincontri et al., 2024). Some studies have focused on the relationship between stakeholder management and artificial intelligence tools (Otero-Mateo et al., 2022). Prebanić & Vukomanović (2021), on the other hand, have explored the digitalization of the engagement process and its impact on manufacturing sector performance, highlighting how digital tools facilitate the adoption of creative and innovative approaches. Another stream of literature has analyzed the potential of artificial intelligence in generating financial value from a multi-stakeholder perspective (Güngör, 2020). In line with this research, Heller et al. (2021) have investigated the role of artificial intelligence in promoting external stakeholder engagement. Despite the growing attention towards stakeholder engagement, especially following the introduction of the Corporate Sustainability Reporting Directive (CSRD) (Petruzzelli & Badia, 2024), studies exploring the influence of artificial intelligence tools in the relationship between stakeholder engagement and social sustainability practices are still minimal (Kopallé et al., 2023), particularly in Italian SMEs and innovative firms

(Belas et al., 2021). To address this gap in the existing literature, based on Ajzen's extended Theory of Planned Behavior (TPB) (2019), this research aims to test the following hypotheses:

H1: Higher levels of stakeholder engagement lead to stronger intentions to adopt social sustainability practices.

According to the extended TPB, once intentions are formed under adequate perceived and actual behavioral control conditions, they should translate into concrete actions. Therefore, firms with strong intentions are more likely to implement measurable sustainability initiatives.

H2: Stronger intentions to adopt social sustainability practices result in the actual implementation of such practices.

We propose that the adoption of AI (e.g., predictive analytics, real-time monitoring) amplifies the link between intentions and behavior by enabling more efficient resource allocation, decision-making processes, and stakeholder engagement.

H3: Adopting artificial intelligence positively moderates the relationship between the intention to adopt social sustainability practices and their actual implementation, strengthening the translation of intentions into behavior.

Methodology. *This study adopts a cross-sectional survey design to investigate how stakeholder engagement influences the implementation of social sustainability practices in innovative Italian SMEs, focusing on the moderating role of Artificial Intelligence (AI). Data will be collected through an online questionnaire administered to the CEOs or sustainability managers of the entire population of 2273 active Italian innovative SMEs identified by the official Chamber of Commerce database. These respondents are well-positioned to provide comprehensive insights into stakeholder practices and sustainability initiatives.*

Stakeholder engagement will be assessed using established instruments such as the Stakeholder Engagement Maturity Model (Viglia et al., 2018; Hollebeek et al., 2022), which capture engagement breadth (e.g., the range of stakeholder groups consulted) and depth (e.g., the extent to which stakeholders are involved in decision-making). Respondents will rate their agreement with items covering proactive communication, systematic incorporation of feedback, and the maturity of their engagement processes (Freeman, 1984; Donaldson & Preston, 1995).

The adoption of AI will be measured through a scale adapted from Ajzen's extended Theory of Planned Behavior (TPB) (Ajzen, 1991; Kumar et al., 2019) to include both perceived and actual behavioral control. Items will gauge organizational attitudes, subjective norms, perceived resources and competences, and the actual availability of technical and human capabilities necessary for implementing AI-based tools-such as chatbots, predictive analytics, big data systems, and sentiment analysis-to enhance stakeholder engagement (Huang & Rust, 2021; Wetzels, 2021).

Social sustainability practices, the dependent variable, will be operationalized as a composite index capturing initiatives and outcomes related to social welfare, equitable labor practices, community engagement, and ethical supply chain management. This index is aligned with current frameworks for social sustainability practices and aims to reflect proactive and reactive engagement with diverse stakeholder groups.

The targeted population comprises innovative SMEs in Italy, identified through relevant national databases and industry registers. A pretested online questionnaire will be administered to ensure precise and reliable measures. To address firm-level heterogeneity, control variables such as firm size, financial performance, and age will be obtained from the Orbis Bureau van Dijk database, given that more prominent or more established enterprises may have more significant resources and more systematic stakeholder-engagement routines (Freeman, 1984; Donaldson & Preston, 1995).

Structural Equation Modeling (SEM) will test the hypothesized relationships. Specifically, we posit that higher levels of stakeholder engagement strengthen intentions to adopt social sustainability practices, which are more likely to be realized when supported by robust organizational control (i.e., adequate resources and capabilities). Additionally, AI adoption is hypothesized to moderate the relationship between these intentions and actual sustainability behaviors, given its capacity to facilitate real-time monitoring, data-driven feedback, and the personalization of stakeholder interactions (Huang & Rust, 2021; Wetzels, 2021). A bootstrap resampling procedure (Preacher & Hayes, 2008) will be conducted to assess the significance of indirect and interaction effects, thereby providing robust estimates of mediation and moderation.

To mitigate common method bias, respondent anonymity will be assured, and the questionnaire will be structured so that items measuring the predictor, mediator, and outcome constructs are grouped separately (Podsakoff et al., 2003). Respondents will be informed about the voluntary nature of participation and the confidentiality of their responses. The study protocol will adhere to institutional ethical guidelines, ensuring data are used strictly for research.

This methodology leverages a theoretically grounded framework (Ajzen, 1991) and rigorously validated measurement scales to offer empirical insights into how stakeholder engagement and AI adoption interact to drive social sustainability outcomes in the context of innovative SMEs. By integrating advanced quantitative methods, secondary data controls, and procedural safeguards against bias, the study seeks to provide robust evidence on the antecedents and enablers of socially sustainable practices.

Expected Results. *Anchored in Ajzen's extended Theory of Planned Behavior (Ajzen, 1991) and the longstanding scholarship on stakeholder engagement (Freeman, 1984; Donaldson & Preston, 1995; Gao & Zhang, 2006), we anticipate several interrelated outcomes. First, innovative Italian SMEs with higher levels of stakeholder engagement-evidenced by systematic stakeholder mapping, active solicitation of feedback, and inclusive decision-making processes-are expected to form stronger intentions to adopt socially sustainable practices (She et al., 2023; Esposito et al., 2025).*

By cultivating positive attitudes, robust subjective norms, and elevated perceived and actual behavioral control, such engagement strategies should lay the groundwork for embedding sustainability into the organizational ethos.

Second, these intensified intentions, in turn, are anticipated to translate into concrete social sustainability behaviors. Drawing on Ajzen's extended TPB, once an enterprise has committed-cognitively and normatively-to pursuing sustainable objectives and possesses the requisite resources and capabilities, it is more likely to enact tangible sustainability initiatives (Winkler et al., 2019; Belas et al., 2021). Empirically, we expect to observe measurable improvements in social sustainability practices indicators, including enhanced labor conditions, deeper community engagement, and ethical supply chain monitoring (Esposito et al., 2025).

Third, adopting Artificial Intelligence tools (e.g., predictive analytics, chatbots, sentiment analysis, real-time monitoring) is hypothesized to function as a significant moderator that fortifies the link between intentions and actual sustainable actions. We posit that SMEs that incorporate AI into their stakeholder management processes will benefit from timely insights into stakeholder expectations, faster detection of emerging social or ethical concerns, and more agile resource allocation (Bosse et al., 2023; Joshi, 2024). As a result, they should be better equipped to convert strong intentions into concrete, socially sustainable outcomes, surpassing the achievements of firms that rely solely on conventional engagement methods (Huang & Rust, 2021; Wetzels, 2021).

Finally, firm-specific attributes-such as size, age, financial health, and sector-are expected to nuance these relationships (Freeman, 1984; Donaldson & Preston, 1995). Larger or more established SMEs may possess superior managerial expertise and technical infrastructure to implement AI-driven stakeholder engagement, accentuating the relationship between higher stakeholder engagement and social sustainability practices (Belas et al., 2021). Conversely, younger SMEs with fewer resources might face constraints in capitalizing on AI's potential, yet could exhibit higher strategic flexibility, potentially spurring innovative applications of AI that yield notable sustainability gains.

Overall, the expected results highlight the pivotal role of stakeholder engagement in shaping sustainable intentions and behaviors and the synergistic effect of AI as a catalyst for realizing such intentions. This multifaceted relationship underscores the broader argument that social sustainability in SMEs is best achieved when human-centric engagement processes are paired with cutting-edge digital capabilities, ultimately fostering a more proactive, inclusive, and ethically grounded approach to business.

Research limitations. *While addressing a topic of increasing relevance, this research encounters several limitations warrant consideration. Firstly, the heterogeneity of innovative Italian SMEs may challenge the generalizability of the findings. Although focusing on innovative SMEs is pertinent, the diversity in sectors, sizes, and business models may necessitate a more detailed sample segmentation.*

Secondly, the territorial context, though mentioned, could benefit from greater attention. The specificities of industrial districts and technology clusters may influence corporate dynamics and AI adoption. An analysis of these influences could enrich the understanding of the phenomenon.

Finally, while a central element of the research, AI adoption may require a more thorough exploration of the different types of AI utilized and the modes of integration into business processes. Analyzing SMEs' digital competencies and change management capabilities could provide further insights.

In summary, the research presents certain limitations that, while not compromising its validity, suggest potential directions for future development. A more detailed approach to sample segmentation, the definition of innovativeness, data access, the territorial context, and AI adoption could strengthen the robustness and generalizability of the results.

Managerial implications. *The managerial implications of this research unfold across several fronts, offering concrete insights for enhancing corporate sustainability. Firstly, the need to invest in mature and structured stakeholder engagement practices emerges strongly. This means moving beyond simple communication, implementing mechanisms for active listening and integrating feedback into decision-making processes. Companies should map and prioritize their stakeholders, focusing resources on the most strategic relationships and integrating engagement into the corporate strategy.*

In parallel, the strategic adoption of AI proves crucial. Investing in AI technologies for engagement, such as chatbots and predictive analytics, allows for the personalization of interactions and anticipating stakeholder needs. However, this requires developing adequate digital skills and an ethical and transparent use of AI. Artificial Intelligence can also support the monitoring of ESG performance, improving transparency and corporate accountability.

Sustainability, therefore, must be organically integrated into decision-making processes, using the data collected through engagement and AI to inform strategic choices. Transparent and responsible communication with stakeholders becomes fundamental to build trust and credibility.

Finally, even with limited resources, innovative SMEs can benefit from AI to enhance their competitiveness. Adapting engagement strategies to available resources, leveraging AI for innovation, and collaborating with other local actors become key success factors.

In summary, this research highlights how an integrated approach, combining effective stakeholder engagement with the strategic adoption of AI, can generate sustainable value for companies, especially in the dynamic and innovative context of Italian SMEs.

Originality of the paper *The originality of this academic research is manifested in a combination of distinctive elements that situate it within a partially unexplored area of investigation, thereby offering a significant contribution to the existing literature. Unlike many studies focusing on large corporations or generic contexts, this research concentrates on innovative Italian SMEs, a crucial segment of the Italian economy (Camagni & Capello, 1998; Kedi et al., 2024;*

Iyelolu et al., 2024). These enterprises, renowned for their capacity for adaptation and innovation, represent a fertile ground for studying the intersection between technology, sustainability, and stakeholder engagement (Freeman, 1984; Ferasso and Sztando, 2022; European Commission, 2023).

The selection of this context allows for examining how AI can enhance social sustainability performance within an environment characterized by dynamism and limited resources, providing valuable insights for business practice. The analysis of AI's impact on social sustainability performance in innovative Italian SMEs offers a novel perspective, as these firms are often at the forefront of technology adoption and the implementation of sustainable practices (World Economic Forum, 2020; Belas et al., 2021; Muto et al., 2024).

The novelty of this research lies in its application of Ajzen's TPB (1991) to investigate how AI moderates the relationship between the intention and implementation of social sustainability practices, moving beyond mere correlational analysis to explore the underlying mechanisms of influence.

While previous studies have explored the impact of AI on stakeholder engagement (Mitchell et al., 1997; Heller et al., 2021; Otero-Mateo et al., 2022; Katsikeas et al., 2023), this research distinguishes itself through a detailed analysis of how AI can facilitate the transition towards proactive stakeholder engagement, employing technologies such as chatbots, predictive analytics, and sentiment analysis. Applying Gao and Zhang's (2006) framework to analyze stakeholder engagement levels and investigate how AI can facilitate the transition to proactive engagement adds an applied dimension to existing theory. This allows for the analysis of progression from passive information sharing to stakeholder-driven management, and how AI can aid in that process.

Despite the increasing emphasis on sustainability and stakeholder engagement, particularly following the introduction of the CSRD (European Commission, 2021; GRI, 2023; Glaveli et al., 2023; Staudt et al., 2023), studies exploring the impact of AI on social sustainability performance in innovative Italian SMEs remain limited (Kopallé et al., 2023). This research addresses this gap, providing valuable insights for companies needing to comply with new regulations and tackle sustainability challenges.

In summary, the originality of this research resides in its capacity to combine a specific and relevant context, an advanced theoretical approach, a detailed analysis of AI's role, and a strong connection with current regulatory trends, thereby offering a significant contribution to the understanding of the intersection between technology, sustainability, and stakeholder engagement in innovative Italian SMEs.

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Using Artificial Intelligence for Improving Sustainability in Smart City

ANGELO RIVA[1]

Abstract

This review study examines the important role of Artificial Intelligence (AI) in fostering green city sustainability. As urban centers grapple with escalating environmental challenges, AI-driven solutions offer promising avenues for optimizing resource management, reducing emissions, and enhancing overall urban resilience. This paper synthesizes current research, exploring the diverse applications of AI across key urban sectors, including energy, transportation, waste management, and urban planning. Furthermore, it identifies critical research gaps and ethical considerations, paving the way for future investigations and responsible implementation of AI in urban sustainability initiatives

Framing of the research. *The process of using artificial intelligence for smart city strategy involves several key stages:*

I. *Shared Vision and Mission: Establishing a shared understanding of the city's goals among political leaders and public officials is crucial for successful implementation. A clear strategic definition is fundamental for developing a balanced scorecard*
II. *Inform and Involve: Ensure that city staff are aware of the strategic goals and receive incentives aligned with their achievement*
III. *Planning and Goal Setting: Set ambitious goals and align annual budgets with medium- and long-term plans.*
IV. *Strategic Feedback and Learning: Employ a team-based approach to problem-solving, recognizing that the strategic process is dynamic and requires continuous adaptation.*

Purpose of the paper. *By analyzing the potential benefits and limitations of AI technologies, this study provides a comprehensive overview of how AI can contribute to the development of sustainable and livable cities (see fig. 1).*

Fig. 1: AI and Sustainability

Source Agenda Digitale

Methodology. *Field research was conducted by using Prisma (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). We use the methodology Prisma to select the most important paper based on the Scopus database. We also use VOSviewer for network and cluster analysis (see tab.1)*

Tab. 1: Results follow the Prisma methodology

IDENTIFICATION	***SCOPUS DATABASE***
	IDENTIFIED "ARTIFICIAL INTELLIGENCE" *N=638326*
SCREENING	*SCREENING AND FILETERING* *"ARTIFICIAL INTELLIGENCE*"* *AND "ENVIROMENT" AND "SMART CITY" AND "SUSTAINABILITY"*
	N=116 ARTICLES
ESIGIBILY	*FULL TEXT ESIGIBILY*
	ARTICLES TO INCLUDE IN LITTERAURE REVIEW ***N=60***

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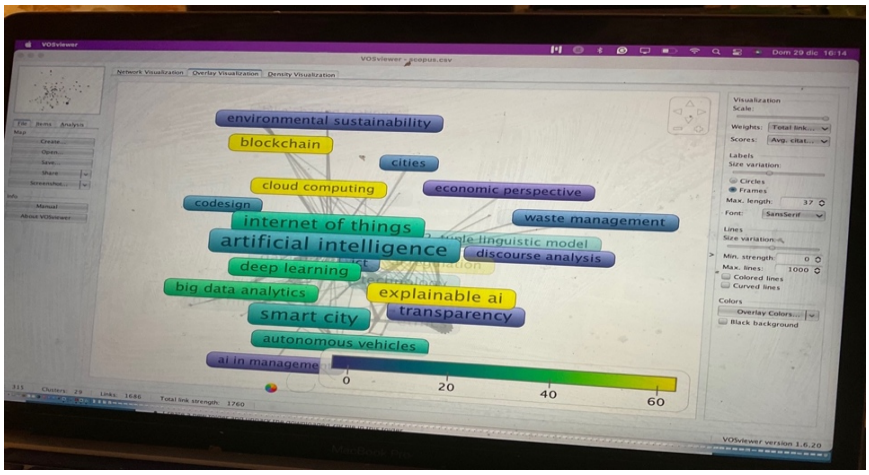
Source our elaboration

A systematic review is a type of literature review that collects and critically analyzes multiple research studies or papers. Systematic reviews are conducted to identify, appraise, and synthesize all high-quality research evidence relevant to a specific question. The importance of systematic reviews lies in their ability to provide a comprehensive and unbiased summary of the available evidence. Overall, systematic reviews are an essential tool for ensuring decisions are based on the best available evidence.
VOSviewer permits to visualization and understanding of complex relationships within research data.
I)Create relationship maps:
II) Uncover hidden connections between words
III) Spot influential publications and authors:
VOSviewer shows you which publications and authors are most cited, highlighting their influence in the field.

Results. *The results describe some distinguishing features After selecting the more relevant paper, we analyze the cluster of the main contributions to underline the main problems and new line of research.*
The network analysis is organized by Vos viewer (see fig.2 and 3).

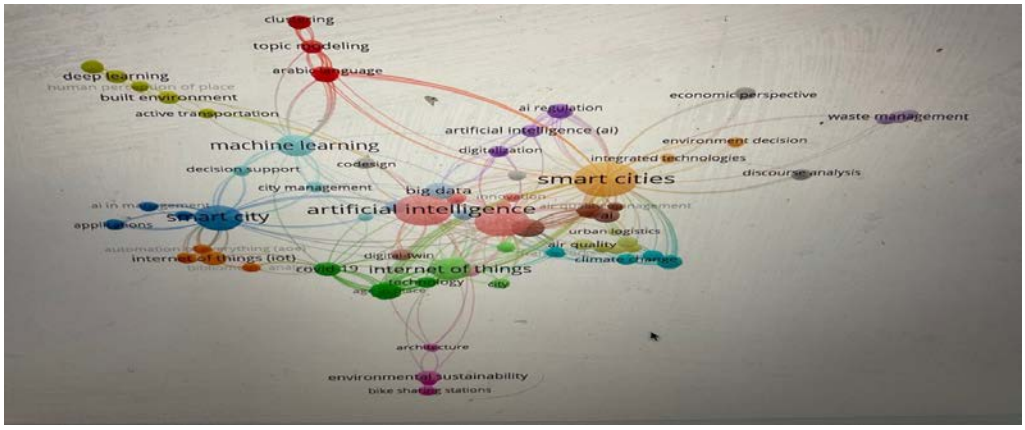
Fig. 2: Vos viewer analysis



Source our elaboration

I) Cluster 1 - AI and environmental sustainability and city by improving environmental monitoring and protection.
II) Cluster 2 - AI and other methodologies for smart city and environmental sustainability. Focus on machine learning deep learning;
III) Cluster 3 - AI and other methodology: focus on the manager of the database and big data - AI and other methodology for smart city big data, cloud);
IV) Cluster 4 AI and other methodology: focus on internet things.

Fig. 3: Network Analysis



Source our elaboration

I) Cluster 5 AI and smart city and mobility and transport and autonomous vehicles;
II) Cluster 6 AI smart city and waste management and economic prospectives.
III) Cluster 7 AI smart city and transparency and explainable city design.

There is the identification of several clusters (see tab. 2)

Tab. 2: Clusters

	CLUSTERS	GROUPS OF PUBBLICATIONS	MAIN RESEARCH AREA
1	**CLUSTER 1 AI** and ENVIRONMENTAL SUSTAINABILITY AND CITY BY IMPROVING ENVIRONMENTAL MONITORING AND PROTECTION	(Abdulkadir et al., 2024; M. Ahmad et al., 2022; Al-Habaibeh et al., 2024; Ingwersen & Serrano-López, 2018; Khlie & Benmamoun, 2024; Marston et al., 2020; Ortega-Fernández et al., 2020; Shruti et al., 2022; Strielkowski et al., 2022; Xu, 2024)	**Pollution and environmental condition control Air and Green Quality Monitoring**
2	**CLUSTER 2 -** AI and other methodology FOR SMART CITY AND ENVIRONMENTAL SUSTAINABILITY. FOCUS ON MACHINE LEARNING DEEP LEARNIG,	(Barletta et al., 2024; Gohari et al., 2022; Kruse et al., 2021; Louati et al., 2024; Park et al., 2019; Rezk et al., 2024; Skubis et al., 2024; Verdejo et al., 2022)	**Predictive ModelingOptimized Resource Allocation**
3	CLUSTER 3 AI AND OTHER METHODOLOGY: FOCUS ON MANAGER OF DATABASE AND BIG DATA - AI AND OTHER METHODOLOGY FOR SMART CITY BIG DATA, CLOUD)	(Alahmari et al., 2022; Escobedo et al., 2024; Qadir & Fatah, 2023; Rani et al., 2021; Silva et al., 204)	**Improved Accuracy and EfficiencyData Availability and Qualit**
4	**CLUSTER 4** AI AND OTHER METHODOLOGY: FOCUS ON INTERNETS THINGS	(Addas et al., 2024; Chahid et al., 2022; Gohari et al., 2022; Gouiza et al., 2024; Kuru, 2021; Lăzăroiu & Harrison, 2021; Simionescu & Strielkowski, 2024)	**Green Infrastructure PlanningReal-time Data Collection and Analysis**
5	**CLUSTER 5** AI AND SMART CITY AND MOBILITY AND TRANSPORT AND AUTONOMOUS VEHICLES.	(Jaramillo-Alcazar et al., 2023; Li et al., 2023; Mohsen, 2024; Neo et al., 2023; Qureshi et al., 2021; Reisi et al., 2020; Shulajkovska et al., 2024)	**Mobility and transport informationTransport optimization.**
6	**CLUSTER 6** AI SMART CITY AND WASTE MANAGEMENT AND ECONOMIC PROSPECTIVES.	(Akkad et al., 2022; Belsare et al., 2024; Zota et al., 2024)	**Waste Management: mage recognition and robotic sorting and AI**
7	**CLUSTER 7** AI SMART CITY AND TRANSPARENCY AND EXPLAINABLE A CITY DESIGN	(Arora et al., 2023; Camaréna, 2021; Elshapasy & Mohamed, 2024; Kuru, 2021; Singh et al., 2020; Verdejo et al., 2022; Yigitcanlar et al., 2021; Zaman & Hertweck, 2022)	**Community Involvement Ethical Considerations**

Source our elaboration

The results analyze the critical role of smart city strategies in driving sustainable urban growth. A city's strategy serves as a unifying framework, guiding decision-making and ensuring consistency Effective urban planning must prioritize the needs of all stakeholders while ensuring environmental sustainability.

Research limitations. *The research is based on a systematic review that selects a limited number of papers and cannot be completed.*

Managerial implications. To give a new practical systemic review on A.I and environmental sustainability (see tab. 3)

The results show the importance of the integration of the process: 1) Sensing; 2) Perceiving; 3). Learning,4). Visualizing, 5) Acting (see tab. 3)

Tab. 3: The Loop of 1) Sensing; 2) Perceiving; 3). Learning,4). Visualizing, 5) Acting

AREA	FOCUS
1.SENSING (computer vision):	Pollution detection: Identifying illegal dumping or industrial emissions from visual data. Disaster response: Assessing damage
2. PERCEIVING (pattern recognition)	Classification and Pattern Recognition: ML algorithms can recognize patterns in data, Analyzing satellite imagery to identify deforestation, urbanization, and other land-use changes. Automatically identifying species from images or sound recordings for biodiversity monitoring. Recognizing different types of waste for efficient recycling.
3. LEARNING (machine learning)	Predictive Modeling: Climate modeling: Pollution forecasting:
4.VISUALIZING (Deep Learning)	Image and Signal Processing: DL is particularly powerful for analyzing complex image and signal data, Extracting information from satellite and aerial imagery for environmental monitoring. Acoustic monitoring: Analyzing sound recordings to detect illegal logging, poaching, or changes in animal behavior.
5 ACTING (Robot and actions)	Robot control Control autonomous vehicles: Designing self-driving cars that minimize emissions and traffic congestion. Develop sustainable urban planning strategies: Finding optimal strategy

Source our elaboration

Originality of the paper. *The original contribution of this paper and the production of new knowledge in the field is to give a new practical framework for the strategic vision, and implementation for planning a smart city using AI-. The original contributions of this research (highlights) regarding the production of new knowledge in the field:*

I) the original description and analysis of the role of A. I (artificial intelligence) in improving green sustainability. II) a new practical framework for new areas of research in the field.

A limitation of this research is based on the method of the review study. Further research can analyze the impact of the strategy of digitalization on green sustainability.

In conclusion, the future is focused on a strong implementation of A. I for an integrated approach for improving the strategy of smart city.

Keywords: *environmental sustainability, smart city, stakeholders' management, planning, strategic vision, sustainability*

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The Circular Revolution Is Served: AI Strategies for Sustainable Competitive Advantage[1]

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Abstract

This research analyzes how artificial intelligence (AI) can support the adoption of circular economy practices in the household appliance sector, using Porter's value chain framework. Specifically, the study, conducted through a multiple case study on three large companies, aims to understand (1) the extent to which AI influences the achievement of circular goals, and (2) which activities within the value chain are most impacted by the use of smart technologies. Data analysis, divided into two phases (secondary data collection and semi-structured interviews), will provide a comprehensive overview of AI applications along the value chain. In line with the literature, it is expected that AI can enhance logistics, production, and distribution. It can support eco-design, optimize the use of materials and packaging, aid in recycling processes, predictive maintenance, and reverse logistics, improving sustainability, efficiency, and corporate responsibility, while also contributing to the transformation of business models towards more collaborative approaches.

Key words: *circular economy; sustainable production; artificial intelligence; value chain; competitive advantage; multiple case study*

Framing of the research. *Environmental damage represents one of the major global concerns, as natural resources are irresponsibly exploited, seriously threatening the ecosystem (Yucedag et al., 2018). Global warming, environmental protection, and climate change require innovative solutions based on advanced technological skills (Al-Ghussain, 2019). In this context, the circular economy emerges as a fundamental paradigm to mitigate environmental impacts, offering a regenerative model aimed at minimising resource waste and optimising their reuse within interconnected production systems (Geissdoerfer et al., 2017). This approach represents a shift from the traditional linear production model, based on the sequence of "extract, produce, and dispose," promoting instead a more efficient and sustainable use of resources (Ness, 2008; Ghisellini et al., 2016; Sauvé et al., 2016). A key factor for the implementation of circular economy practices is digitalization (Cagno et al., 2021), which plays a fundamental role in the reconfiguration of sustainable business models (Ellen MacArthur Foundation, 2019), increasing operational efficiency, and opening new perspectives for creating sustainable value in line with Sustainable Development Goals (SDGs),*

In particular, among the technologies of Industry 4.0, Artificial Intelligence (AI) plays a crucial role in resource management, promoting sustainable practices throughout the entire supply chain (Gupta et al., 2019). AI enables the optimization of resource usage, reduces waste, and encourages sustainable behaviors (Duan et al., 2019; Tutore et al., 2024), in addition to facilitating the creation of digital platforms that encourage collaboration among companies engaged in sustainable practices (Tutore et al., 2024). Thus, the contribution of AI to the circular economy is particularly evident in improving recycling operations and waste management. For example, advanced algorithms can optimize the sorting and separation processes of materials, increasing the efficiency of recycling facilities (Tutore et al., 2024). Furthermore, AI can encourage consumer engagement in adopting more circular behaviors (Testa et al., 2020).The creation and enhancement of digital ecosystems represent another key aspect for the widespread adoption of the circular economy. In this context, AI can support the development of digital platforms that promote collaboration among companies, facilitating resource sharing and organizing supply chains based on circularity principles (Tutore et al., 2024) While recognizing the already identified benefits, it becomes essential to explore the potential challenges arising from the use of AI-based technologies. Among the main critical issues are the energy consumption of data centers, the extraction of resources required for the production of technological devices, and the ethical implications related to data management

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(Al-Sharafi et al., 2023). Therefore, adopting a balanced approach that considers both the opportunities and the limitations of digital technologies is crucial to ensure an effective and sustainable transition to a circular economy.

To analyze the impact of artificial intelligence on circular economy practices, the framework of Porter's value chain (Porter, 1985) was chosen.

Integrating AI within Porter's Value Chain framework provides a useful structure for analyzing its impact on circular economy practices. Porter's Value Chain framework helps businesses systematically assess how AI can enhance efficiency, reduce waste, and create value across primary and support activities. By breaking down business operations into distinct components. It becomes easier to identify opportunities where AI can optimize processes, improve resource allocation, and minimize environmental impact.

According to Porter, a company creates value for the customer through its activities, which is measured by the price the customer pays or would be willing to pay for the product (Sciarelli, 2022). The concept of the value chain helps to understand the sources from which competitive advantage can be derived for the company (Porter, 1985). Specifically, two groups of functions are identified: primary activities and support activities.

Primary activities are represented by production and sales functions, and are divided into the following areas:

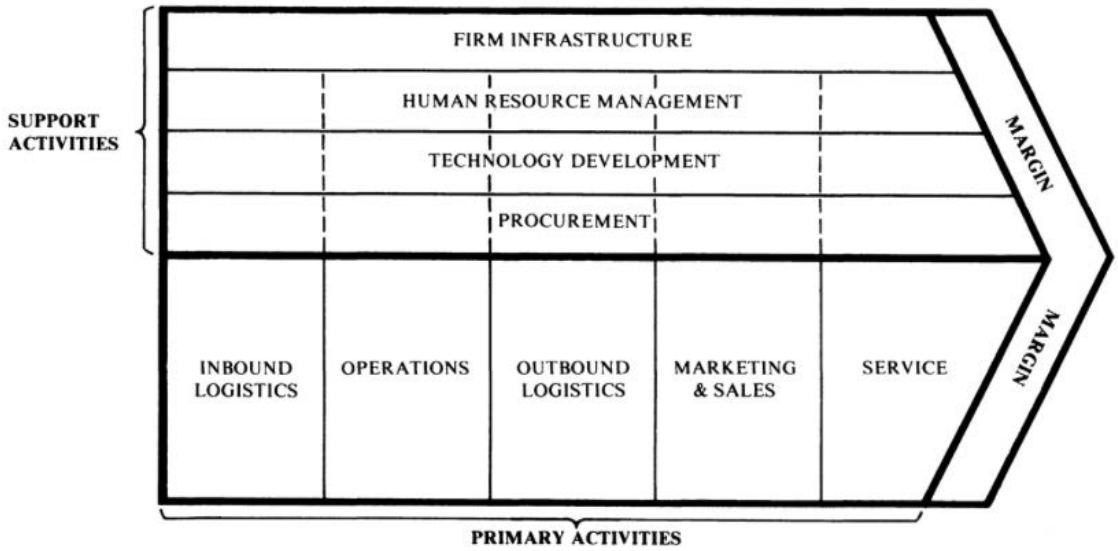
- ***Inbound Logistics**: This includes the receiving, storing, and distributing raw materials or components to the production facilities. AI can optimize inventory management, predict material demand, and streamline the supply chain by integrating real-time data to reduce waste and inefficiency.*
- ***Operations**: This involves transforming raw materials into finished products. AI can play a pivotal role in automating manufacturing processes, improving production schedules, and ensuring quality control. Additionally, AI-based systems can contribute to reducing energy consumption and minimizing material waste, thus enhancing the sustainability of production practices.*
- ***Outbound Logistics**: This covers the distribution of finished products to customers. AI can optimize delivery routes, enhance warehouse management, and improve packaging processes to reduce the environmental footprint of logistics activities. Machine learning algorithms can predict demand patterns, reducing overproduction and waste in the distribution process.*
- ***Marketing and Sales**: This involves activities related to advertising, promotion, and selling products. AI technologies can help companies segment their customer base more effectively, personalize marketing campaigns, and predict customer preferences, leading to more sustainable consumer engagement. Moreover, AI can support the promotion of circular products and services, such as those with extended lifecycles or offering shared use options.*
- ***Services**: This includes post-sales activities such as customer support, maintenance, and repair services. AI can enable predictive maintenance and remote diagnostics, extending the lifespan of products and reducing the need for repairs or replacements. It also facilitates the development of services related to product reuse, remanufacturing, and recycling, further enhancing circularity.*

Support activities, on the other hand, provide the foundation for the actual realization of primary activities and are divided into the following areas:

- ***Infrastructure Activities**: These include the organizational structure, management, and planning processes. AI can optimize business processes, support decision-making through data analytics, and streamline strategic planning, aligning operations with circular economy goals.*
- ***Human Resource Management**: This involves recruiting, training, and developing employees. AI can support talent management by using predictive analytics for workforce planning, offering personalized training programs, and automating administrative tasks to free up time for more value-added activities. In the context of the circular economy, AI can help identify skill gaps related to sustainability and circular practices, fostering a more knowledgeable and efficient workforce.*
- ***Technology Development**: This refers to the design and improvement of products and processes. AI falls under this category, where its application can lead to the development of new circular products or services, such as products designed for disassembly, recycling, or remanufacturing. AI can assist in optimizing product design, material selection, and manufacturing processes to reduce environmental impact and improve the overall circularity of products.*
- ***Procurement**: This includes the sourcing of raw materials and components. AI can enable smarter procurement strategies by analyzing supplier performance, optimizing purchasing decisions, and reducing the environmental impact of supply chains. Additionally, AI can support the identification of sustainable suppliers, materials, and practices, contributing to the circular economy by promoting responsible sourcing.*

In summary, the integration of AI across both primary and support activities in Porter's value chain can contribute to enhanced sustainability by improving efficiency, reducing waste, extending product lifecycles, and fostering the circular economy. Below is the framework of the Value Chain:

Fig. 1: Value Chain



Source: Porter, 1985

Purpose of the paper. *The goal of this study is to systematically analyze the relationship between artificial intelligence (AI) and the circular economy, focusing particularly on the different primary activities of Porter's value chain (such as logistics, operations, marketing and sales, as well as post-sale service). Through an in-depth analysis of how AI can promote more sustainable production and consumption models, the research aims to identify the business areas where AI can most contribute to reducing waste, extending product life cycles, and promoting the recovery and reuse of resources, in line with circularity principles. Furthermore, it seeks to assess how technologies such as machine learning, predictive analytics, and intelligent automation can be integrated into various stages of the value chain, with the intention of providing a clear and comprehensive vision of how artificial intelligence can be used not only to create economic value but also to achieve environmental and social sustainability goals. In light of this, the study aims to answer the following research questions:*

RQ1: To what extent does artificial intelligence influence the implementation of circular economy practices within the company?
RQ2: In which activities of Porter's value chain is the impact of AI most significant?

Methodology.*The methodology adopted in this research is based on a multiple case study analysis. While presenting some limitations mainly related to issues of reliability and validity (Ginsberg and Abrahamson, 1991; Yin, 2003), this approach offers the opportunity to explore the phenomenon under study in depth, highlighting more subtle aspects. This ability to provide a detailed understanding makes case study analysis particularly suitable for the objectives of this investigation (Eisenhardt, 1989). To increase the robustness compared to a single case study, the analysis involves three companies (Yin, 1994). The selection focused on large companies operating in the household appliance sector, identified for their presence of products that utilise artificial intelligence with the aim of reducing waste and promoting circularity. The selection criteria, therefore, included the type of industry, product category, company size, and ownership structure (Silverman, 2000). As emphasized by Eisenhardt (1989), case selection plays a crucial role in theory building, as a precisely defined population allows for strategic sampling, management of external factors, and the delineation of the validity boundaries of the results.*

In line with the existing literature (Yin, 2003; Gnyawali & Park, 2011), the data collection process will be carried out in two phases, consistent with the same approach. In the first phase, secondary information will be gathered through company websites, sustainability reports, and official documentation of the companies. In a later phase, the research team will conduct semi-structured interviews to gather further information. The involvement of multiple researchers will enrich the analysis, as the diversity of perspectives will enhance the quality of the data, and the convergence of observations will strengthen its credibility (Eisenhardt, 1989).

Expected Results. *The integration of AI into Porter's Value Chain provides a structured approach to evaluating its impact on circular economy practices. By breaking down business activities into primary and support functions, this framework helps identify where AI-driven innovations can optimize processes, reduce waste, and create sustainable value. AI enables businesses to enhance operational efficiency through predictive analytics, automation, and data-driven decision-making, fostering a more circular and resource-efficient economy. From supply chain optimization to eco-friendly product design, AI can be a transformative tool for reducing environmental impact while maintaining economic*

competitiveness. The following tables outline the expected AI-driven outputs across primary and support activities in the value chain.

Primary Activity	***Expected Output with AI***
Inbound Logistics	*- Optimization of procurement with predictive algorithms.* *- - Waste reduction through advanced stock management.*
Operations	*- Reduction of production waste through real-time analysis.* *- - Predictive maintenance to extend machinery lifespan.* *- - Optimization of resource usage (energy, water, raw materials).*
Outbound Logistics	*- AI-optimized transport routes to reduce CO_2 emissions.* *- - Minimization of excess inventory through demand forecasting.*
Marketing & Sales	*- Personalization of offerings based on consumer behavior analysis.* *- - Promotion of recycled or circular products using AI insights.*
Service	*- Product lifecycle extension through predictive maintenance.* *- - Automated customer support for repairs and reuse.*
Support Activities	***Expected Output with AI***
Firm Infrastructure	*- AI-powered decision-making for sustainability strategies.* *- - Risk assessment for circular supply chains.*
Human Resource Management	*- AI-driven workforce training for sustainable practices.* *- - Talent acquisition focused on circular economy expertise.*
Technology Development	*- AI-assisted eco-friendly product design.* *- - Digital twins for process optimization and lifecycle analysis.*
Procurement	*- AI-driven supplier selection based on sustainability criteria.* *- - Smart contracts for ethical sourcing.*

Based on the evidence from the literature, it is expected that artificial intelligence can significantly contribute to waste reduction, recycling, and the reuse of materials, as well as to the design of more sustainable life cycles, with tangible impacts on costs, consumption models, and environmental impact (RQ1) (Sarc et al., 2019; Agrawal et al., 2022; Nowakowski et al., 2020; Nañez Alonso et al., 2021). One of the main expected outcomes is to demonstrate the crucial role played by AI, not only in enhancing existing processes but also in fostering broader changes, such as the evolution of business models and the development of collaborative ecosystems (Pinheiro et al., 2022; Ramakrishna et al., 2020).Regarding the specific area of primary activities in Porter's value chain (RQ2), the aim is to highlight particularly the potential of AI in the areas of Operations and Outbound Logistics, where the automated classification and treatment of waste can ensure greater process efficiency and a tangible reduction in waste (Agrawal et al., 2022; Sarc et al., 2019). Similarly, it is plausible that Marketing and Sales can also benefit from the application of AI algorithms, especially for promoting products with extended life cycles and sharing and reuse services (Mboli et al., 2023). Furthermore, the important role of Service in extending the useful life of products is evident, thanks to opportunities for predictive maintenance and constant resource monitoring (Bianchini et al., 2019; Colla et al., 2020). Overall, a positive correlation is expected to be identified between the use of AI and the ability to create a significant impact across the entire value chain, highlighting how, as the company's circular ambition level increases, both competitive advantages and environmental benefits become progressively more relevant (Velis, 2018).

Research limitations. *This research presents several points of attention that should be noted. Firstly, the analysis is limited to artificial intelligence, excluding other emerging technologies such as the Internet of Things, Big Data Analytics, or Augmented Reality. Consequently, future studies could broaden the scope by integrating these tools as well, to more thoroughly assess the factors that promote their adoption and their impact on the circular economy. Secondly, the study focuses on the positive outcomes of technological use, overlooking the potential negative effects that could emerge. Lastly, the generalizability of the results is limited by the small number of cases analyzed in the multiple case study.*

Managerial implications. *The research will provide practical recommendations and strategic insights for businesses and policymakers, with the aim of facilitating a conscious and targeted adoption of artificial intelligence (AI) to support the transition towards a circular, sustainable, and competitive economic model in the long term. In this context, the work will offer a clear and comprehensive vision of how AI can not only generate economic value but also contribute to achieving environmental sustainability goals. These elements can, in fact, stimulate the development of new business strategies and circular innovation practices, creating tangible opportunities for the responsible and profitable evolution of organizations.*

Originality of the paper. *This study enriches the existing body of knowledge by examining the intersection of artificial intelligence (AI) and circular economy (CE) through the conceptual framework of Porter's value chain. While the literature has already explored the role of digitalization in promoting circular business models, this work distinguishes itself by analyzing the specific impact of AI on primary activities within the value chain, highlighting its contribution to business transformations oriented towards sustainability.The originality of the contribution lies in its empirical investigation of AI applications in large manufacturing companies, with a particular focus on the household appliance sector. This approach allows for a deeper understanding of the mechanisms through which AI supports circular economy practices, providing a solid foundation for comprehending its strategic implications. Furthermore, the research*

contributes to the debate on sustainable digital transformation, highlighting the interconnection between AI, business strategy, and circular economy goals. This perspective allows for a more precise identification of the high-impact applications across different business functions-from logistics and operations to marketing and post-sales services-enriching the strategic discourse on integrating AI into circular economy models. Ultimately, the work makes a significant contribution to advancing knowledge on how AI can be effectively employed to enhance circular economy initiatives within the business context.

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“Donor preferences between search engines and Large Language Models (LLMs): Transforming donor decision-process in non-profit fundraising”

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Abstract

This research explores the choice between traditional search engines and Large Language Models (LLMs) when donors gather information about non-profit organizations. Donors traditionally rely on search engines to find organizations that match their values and personalities, assessing factors such as mission objectives, project impact, and transparency. LLMs are set to complement or even substitute search engines as they provide user-friendly, concise, and conversational responses that simplify information retrieval. Concerns however emerge regarding the factual accuracy and reliability of the information provided by LLMs.

The study employs a sequential exploratory mixed-methods approach, starting with 30 qualitative interviews with first-time and repetitive donors in Italy, followed by a quantitative questionnaire conducted with 300 respondents.

Preliminary findings show that donors tend to mirror their general propensity to LLMs to the non-profit context. Frequent LLM users are likely to extend the inquiries to non-profit. LLMs are primarily employed for initial assessments of non-profits with the creation of lists of potential recipients based on causes of interest. More detailed information, such as project evaluations and organizational accountability, is still predominantly acquired through traditional search engines and non-profit websites. Existing donors use LLMs to monitor project progress and explore new opportunities for further engagement. LLMs complement search engines when seeking new non-profits to donate to, and can substitute them when researching organizations to which donors have already contributed. Overall, donors generally perceive information from LLMs as reliable and accessible, with a similar level of trust than search engines.

This study highlights the strategic importance for non-profits to integrate LLMs into their fundraising strategies. Non-profit organizations should actively monitor the responses to potential donors and optimize their digital content to mitigate the risks of misinformation, as LLMs may use different learning reference sources compared to search engines. Non-profit organizations should also assess the development of tailored, domain-specific LLMs to interact with individual donors.

Framing of the research. *Donors to non-profit organizations employ complex search processes to choose the non-profit organizations to donate to and consider many factors during the processes involving a prolonged search of information (Gregory, Ngo and Miller, 2019). The processes vary according to the donor”s socio-demographic and personality characteristics, their preferences, and external motivations (Bavčević, Najev Čačija and Pepur, 2022). Traditionally, the main sources of information have been digital sources, primarily, search engines (Athey et al., 2024) as well as social networks (Klafke et al., 2021; Oliveira et al., 2021), and word of mouth from existing donors, volunteers, and employers of non-profit organizations (Athey et al., 2023).*

Search engines are employed by donors to discover non-profit organizations that resonate with their own core values and match their aspirations for support specific causes (Sneddon, Evers and Lee, 2020). Donations to non-profit do not entail any exchange of benefits, hence, the evaluation exclusively concern the projects, social campaigns, and activities that are carried out by the non-profit. At first, donors use search engines to discover new organizations that contribute to a general cause, such as, healthcare, environmental concerns, education. Also, donors can find out non-profit organizations that are active in their local communities and are potentially involved in local issues. Donors are often segmented following their preferences for international causes, particularly in developing countries, and local causes (Sirisena and Shneor, 2018). Once identified a list of suitable non-profit organizations, donors can look for information through search engines on the trust and transparency of the organizations. The financial sustainability, accountability, and the ratio of administrative costs over project costs can also be used to rank the organizations to donate to. However, donors tend to prioritize nonfinancial information such as programs, projects, and missions of the non-profit over financial information. Even if donors acquire and analyze financial information, they seem to be less likely to influence

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their donation choices (McDowell, Li and Smith, 2013). Search engines may also be functional to existing donors to control how projects evolve and the contributions that donations did, to learn about new activities, and confirm the overall legitimacy of the non-profit management (Athey et al., 2023). Given the relevance of the search engines in the donation process, non-profit organizations have widely engaged in Search Engine Optimization (SEO) strategies and created engaging and high-quality content in the form of blogs, reports, and testimonials (Lindfors, 2018).

Until recent days, Google played an almost monopolistic role in the search engines with an almost 90% market share worldwide in November 2024 (Statcounter, 2024), with Microsoft Bing scoring 4% while Yandex and Baidu are the main search engines used in the Russian and Chinese markets (Strzelecki, 2024). However, the emergence of Large Language Models (LLMs) have the potential to rapidly substitute the search engines because, among the emerging areas of applications, LLMs are perceived as a possible game changer in the search engine market. Given its significant investments in Open AI, Microsoft attempts to gain significant market share with ChatGPT against the market leader Google, although Google has already implemented its own AI LLM model Gemini (previously Bard) (Filippo et al., 2024; Strzelecki, 2024). Indeed, at the end of October 2024, ChatGPT has launched its specific search engine application ChatGPT Search (Kimberley Kao, 2024).

Considered this market evolution, users of search engines are likely to increasingly rely upon LLMs when looking for information and advice (Tafesse and Wien, 2024). Also, users of search engines will be gradually exposed to search engines that incorporate the AI features in the search engines (Zhou et al., 2024). The user"s experience between search engines and LLMs is however different. Search engines categorize existing web pages according to an algorithm assessing the relevance and popularity of webpage. When prompted with a direct question, search engines will provide an answer list or a featured extract with a quotation from the consulted webpage. Conversely, LLMs present verbal responses in the form of complete answers. These responses originate from schemes that the LLMs learn from the training data. The LLMs re-elaborate the information following the data scheme through a statistical model (Memon and West, 2024).

The differences are also connected with the different technological stages that the two systems face, search engines are at their maturity peak while LLMs have to consolidate their functions for users. Search engines started as simple catalogs and evolved as complex platforms with many different features, such personalized suggestions, sponsored results, and voice control (Strzelecki, 2024). The evolution of LLMs as search engines is to still to be determined among users, particularly if search engines will incorporate the LLM capabilities.

In terms of user experience, search engines may be favored because of their interface, which presents an effective combination of text, images, and videos associated to a specific query. Users are directly connected with the typology of information that they need with the associated web link. Search engines feature stable and immediate responses and offer a constant access to real-time data (Strzelecki, 2024). LLMs are conversely preferred because of the convenience of their responses (Shen et al., 2024). As LLMs generate responses in paragraph form and prose, they are more accessible and closer to the current way users communicate in their everyday interactions (Shen et al., 2024). LLMs are capable of extracting and summarizing meaningful information for users and minimize the burden of browsing countless web links (Zhou et al., 2024). According to a recent study (Xu, Feng and Chen, 2023) using a randomized online experiment, LLMs users spend less time on retrieving information tasks as compared to search engine users, although no significant difference in the task performance was observed. In addition, LLM users perceive that they obtain higher quality and immediate information as compared to search engines.

The main issue with LLMs comparing with search engine is however the reliability of the retrieved information (Labrague, 2024). LLMs produced in numerous occasions plausible but inaccurate information, such as false biographical details, made-up references, falsified financial data. Erroneous information has already generated negative real-world consequences (Arcila, 2023). Indeed, LLMs are frequently affected by the so-called "hallucinations" that are defined as factual inconsistencies or factual inventions in the content generated. LLMs prompt sequences of words from probabilistic statistical models from the training data without a proper sense of the overall meaning. This process is inherently conditioned by a level of unpredictability, as LLMs can make up information to fill gaps in their knowledge in the attempt to generate a complete sentence (Zhao et al., 2023). Additionally, the probabilistic models can naturally favor certain typologies of sources over others and can arbitrarily select certain data limiting the depth and diversity of the sources and increasing the probability for erroneous information. If vast amount of data contains stereotypes, clichés, and distorted societal images, LLMs can inadvertently absorb and mirror these biases in their responses (Memon and West, 2024). This process may intensify over time because with the growing use of LLMs, LLMs will probably index the generated content from other AI, amplifying the biases and spreading false information. A recent research (Liu, Zhang and Liang, 2023) on the reliability of four popular LLMs point out that only 51.5% of generated sentences are supported by citations and 74.5% of citations support their associated sentence. Another research (Shen et al., 2023) on ChatGPT"s reliability through a set of 5,695 questions across ten databases and eight domains poses significant doubts on the ChatGPT responses as the reliability greatly varies across different domains with a worrying underperformance in scientific responses. ChatGPT is shown to be particularly sensitive to adversarial examples, meaning designed training data to cause the platform to produce false and misleading responses. This raises significant concerns on sensitive domains, such as politics, commercial offers, social campaigns. Nonetheless, in specific and well-studied applications, comparisons between LLMs and search engines have shown more favorable results for LLMs in terms of reliability and credibility of the sources. In the medical field, for example, LLMs appear to offer strong potential in patient treatment and communication. Dubin et al. (2024) prompted a variety of possible patient inquiries to ChatGPT and Google Search and found out that ChatGPT primarily employed academic (38% vs 15%) sources contrary to Google Search that counted

on commercial sources (32% vs 11%). Notably, 39% of the patient inquiries delivered divergent answers between the two platforms. Further, Russell et al. (2024) accomplished on Alcohol Use Disorder (AUD) and the accessibility of treatments online through LLMs by potential patients. ChatGPT effectively answered to AUD treatments with 92% (59/64) of responses based on scientific evidence and only 12.5% (8/64) encompassed referrals to external sources. (Sun et al., 2023)explored the capabilities of ChatGPT vs. Google Search as a diagnostic support tool for urological pathologies in a sample of 60 clinical cases. ChatGPT showed a more reliable diagnostic accuracy than Google Search, although its capability in detecting rare conditions is still delimited.

To summarize, LLMs appear to be very promising as search engines because of their user-friendly and concise responses and have a strong potential to substitute the traditional search engines or at least to be integrated in their existing platforms (Sun et al., 2023). Users show a similar if not stronger trust in LLMs than traditional search engines and, since they offer a persuading and authorative style, users perceive the statements as more credible (Xu, Feng and Chen, 2023).

Companies and organizations can take advantage of LLMs as search engines and enable their key consumers and stakeholders to access meaningful information in a rapid and comprehensible way. Nevertheless, lack of factual accuracy associated to hallucinations and missing or made-up sources (Shen et al., 2024) remains a critical challenge, which AI developers need to address (Arcila, 2023). Factual accuracy is a serious concern for companies and organizations that depend on user decisions driven by search information from LLMs (Zhao et al., 2023). Companies and organizations can jeopardize their reputation and credibility with core customers and stakeholders if LLM deliver false and misleading information. Among other solutions, numerous small domain-specific search engines are likely to emerge where training data can be more readily controlled and a pool of experts can be employed to check the responses (Memon and West, 2024).

Purpose of the paper. *This research aims to explore the potential transition of donors to non-profit organizations from using search engines to LLMs when they seek information. In this context, the other sources of information for donors are excluded, primarily, social networks and word of mouth from non-profit stakeholders. Search engines play a significant role in the donor decision making process and LLMs are expected to substitute and integrate search engines in the foreseeable future. Therefore, this study is important to understand if and how the donor decision-making process of donors will adjust to these changes in the search engine setting. It is also relevant to appreciate how donors perceive the information originating from LLMs as their interfaces are more direct and user-friendly, although, the probabilistic analysis of data in LLMs expose the responses to false and misleading information. In this investigation, first-time donors are examined who try to find a non-profit organization whose cause and mission is compatible with their values and personality characteristics. In addition, existing donors can review other non-profit organizations working on similar or different causes. Non-profit organizations engaged in local causes can be discovered as well as non-profit organizations involved in international projects. Existing donors can also evaluate their selected non-profit organizations by monitoring the progress of sponsored projects and social campaigns, financial accountability and transparency, and commitment to the mission, with the possibility to increase their contributions or become monthly givers.*

Based on the literature review and the research context, the following grand-tour questions are proposed:

1) *Will donors seeking non-profit organizations to support partially or completely replace search engines with LLMs? If so, what types of information will they prefer to search for using LLMs instead?*
2) *Will donors researching the non-profit organizations they have already supported partially or completely replace search engines to LLMs for their inquiries? If so, what types of information will they prefer to search for using LLMs instead?*
3) *How will donors perceive information from LLMs compared to search engines? Will donors regard it as more reliable and trustworthy?*

Methodology. *Given the objectives of this study, a sequential exploratory mixed methods approach is selected. This research design comprises both qualitative and quantitative methods in a specific sequence, normally, starting with the collection and analysis of qualitative data followed by quantitative data (Bowen, Rose and Pilkington, 2017). This approach is chosen when the research questions are complex and subjective motives and intentions of participants are relevant in understanding the reality, while still relating to objective facts (Gill and Johnson, 2002). In addition, this method can be useful when the study evolves in a dynamic social construct, where variables can develop in uncertain directions and the framework can change within the period of the examination (Ivankova, Creswell and Stick, 2006). This study focuses on how donors subjectively evaluate information from two alternative digital sources, while the advancements in LLM technology can unpredictably modify the nature of user interactions. The first qualitative phase of a sequential exploratory approach focuses on obtaining a deep understanding of the phenomenon under investigation. In this phase, the data will be collected through in-depth interviews, meaning individual, face-to-face interviews where the list of questions is unstructured. Unstructured interviews are appropriate for evaluating subjective issues and opinions of respondents in contexts that are not influenced by theoretical assumptions. Moreover, open-ended interviews allow analyzing beliefs and values that respondents use to process information (Gubrium and Holstein, 2002). Other sources of qualitative data will be excluded as the focus is on the donor behavior. The collected qualitative data will be analyzed using thematic analysis with the identification of recurring themes and patterns (Almeida, 2018). The key goal of the qualitative data is to generate insights into participants" perceptions and attitudes and develop a theoretical framework*

and hypotheses to direct the next quantitative phase. The quantitative phase comprises of collecting quantitative data to generalize the findings from the qualitative phase. A questionnaire will be designed based on the insights generated in the qualitative phase and will include questions that test the hypotheses set in that phase. This phase will encompass a representative sample to allow for generalizability of results (Wadongo, 2014). The quantitative data will be analyzed employing statistical methods, in detail, descriptive statistics, inferential statistics, and factor analysis. After completing the quantitative phase, the results will be integrated to indentify potential inconsistencies and outline definitive research conclusions. Interpretive integration will be used to fully understand how the qualitative insights explain and provide a framework for the quantitative results The combination of qualitative exploration and quantitative testing enables to obtain deep, detailed insights and the ability to generalize findings (Ivankova, Creswell and Stick, 2006).

The participants to the study will include first-time donors and repetitive donors to one or more non-profit organizations, and have used search engines to gather information about these organizations. These will be donors to three existing non-profit organizations that raise funds in the Italian market, though their operations can extend internationally, within or outside the European Union. To ensure a broad research scope, the three non-profit organizations represent three different causes, in detail, healthcare in developing countries, environmental sustainability, and support to agricultural production in developing countries. Participants will be over 18 years old and proficient in Italian, as the data will be collected in Italian. Donations will be classified as small, ranging from 10 euro to 250 euro (Brockner et al., 1984). Big and corporate donors will be excluded from the study.

The round of in-depth interview will be conducted with 30 participants meeting the aforementioned criteria, with the condition that only 10 of them will be first-time donors. This ensures a more tailored appreciation of the second grand-tour question while still including a significant representation of first donors. The in-depth interviews will last between 30 to 45 minutes. Once the interviews will be concluded and the data analyzed, the questionnaire will be designed to test the hypotheses generated. A sample of 300 participants is predicted with a sample of 100 first donors.

Results. *At the moment of writing, 19 in-depth interviews were conducted as part of the initial qualitative phase. This paragraph offers a summary of the preliminary findings before the completion of all 30 in-depth interviews.*

The general propensity to use LLMs is the main factor influencing their use when looking for information about non-profit organizations. If participants frequently rely on LLMs for different tasks, such as research assistance and quick answers to specific questions, whether on computers or smartphones, they are likely to inquiry about potential donation recipients, without a specific preference for non-profit.

As participants search for a non-profit organization associated to a cause (Grand Tour Question 1), they often turn to LLMs as an initial source of information to generate an initial list of potential recipients. Subsequently, they use search engines to deepen and enrich the information and focus on the non-profit website, external media coverage, independent reviews, and specific projects. Specific financial details are rarely checked at this initial stage. First-time donors are more inclined to rely on LLMs for generating the initial list, particularly if they get interested in a cause that has recently caught their attention on the news. In contrast, repetitive donors looking for a non-profit in a different cause rely less heavily on LLMs. LLMs were employed to identify non-profit organizations addressing local issues, while search engines were favoured to explore involvement in international operations. No significant differences were noticed across different types of causes. Hence, during the initial stages of the donation decision-making process, LLMs tend to complement search engines rather than substitute them and are employed for preliminary screening.

As existing donors conduct additional research on the supported organizations they support (Grand Tour Question 2), they tend to mirror their general propensity on LLMs, meaning that participants that frequently use LLMs tend to to use it more extensively for non-profit organizations. They show a particular interest in the progress of the projects that the organization is accomplishing as well as in additional projects that the organization is involved in. They also monitor events that the organization sets, in one case, the non-profit organization regularly hosts civil gatherings and local inverventions where, inviting donors to participate. Financial details are rarely reviewed, although, LLMs are consulted to check project expenses when assessing additional donations. In particular, participants were interested in the costs of a complex international project where the outcomes were difficult to evaluate. When employed, LLMs tend to completely substitute search engines and play a significant role in the decision-making process for additional donations.

Regarding the perception of information from LLMs (Grand Tour Question 3), participants show significant trust on the information provided and view it as reliable and well-grounded. Overall, their attitudes toward LMMs and search engines are similar in terms of information quality and authenticity. They only occasionally check the sources and references provided by LLMs, and when they do, they demonstrate full confidence in the list of sources. When asked about potential hallucinations in LLMs, participants appear to be mostly unaware of this issue and attribute any misleading information to the unreliability of the Internet. In any case, they seem to confide more on LLMs than social networks, in particular TikTok. To conclude, partecipants appreciate the type of responses and interface that LLMs provide and they believe that the information is easier to access and understand.

Research limitations. *The main limitation of this research is the uncertainty in predicting how the LLM technology will evolve in the foreseeable future and how users will interact with it. LLMs are at the early stages of their technological life cycle and the competitive market is still to consolidate. During in-depth interviews, almost all participants referred to LLMs as OpenAI's ChatGPT, but it is difficult to predict if new players and platforms will emerge. Also, LLMs are likely to be integrated into search engines, making the distinction and the alternative for donors proposed in this study obsolete in case of a total integration. However, it remains unclear whether traditional search engines will still be available and whether certain user segments will continue using them despite the forthcoming integration.*

The second limitation is that all participants in this study are Italian speakers and all-non-profit organizations accomplish their fundraising strategies in the Italian market. Hence, the findings cannot be extended to other national cultural contexts. Different cultural paradigms can influence how participants interact with technology and perceive information. Also, the donation process can inadvertently reflect the specific cultural norms, for example, concerning the accountability and transparency of non-profit organizations. The study also covered three causes to broaden its scope, nonetheless, other relevant causes were excluded, where donor behavior and preferences can differ completely. Some non-profit organizations can stand out for their adversary and controversial approach to companies and governments, which can influence the types of donors and their personality characteristics.

In conclusion, the limitations for the sequential exploratory mixed method apply in this research, where the integration of qualitative findings into the quantitative stage can be difficult, particularly when qualitative themes are complex to translate into quantitative variables. Obviously, the small number of participants in the in-depth interviews and questionnaire restricts the generalizability of the research outcomes.

Managerial implications. *This research demonstrates that donors employ LLMs in their donation decision-making process. As a result, non-profit organizations should include LLMs in their digital promotion fundraising strategies to engage both first and repetitive donors in close combination with search engines. Donors tend to look for non-profit organizations that operate in causes that interest them and match their personal values. Also, donors explore ongoing and new projects through LLMs, and in some cases, review project expenses.*

Consequently, non-profit organizations are advised to test LLMs with a wide range of inquiries and closely review the responses offered to potential donors. It is important that documents produced by the non-profit align with certain causes and that LLMs include the non-profit in the suggested list, otherwise, fundraising strategies can miss significant donation opportunities. Also, projects must be clearly described and consistent across all sources, since LLMs can use different learning mechanisms and reference sources that were overlooked by search engines.

Non-profit organizations must exercise caution to adversarial examples. As mentioned by Shen et al. (2023), LLMs are significantly sensitive to designed training data to cause the platform to produce false and misleading responses (Shen et al., 2023). Controversial or adversarial non-profit organizations can be significantly exposed to adversarial examples because LLM prompts can be manipulated by interested parties and can be sourced to external media and social networks as LLM credible material. To mitigate the risks, non-profit organizations need to be constantly alerted and prepare alternative material from LLMs to counteract potential negative arguments.

Given the relevance of LLMs and the associated issues, non-profit organizations should consider creating small-domain LLMs that are specifically trained by a pool of non-profit employees and stakeholders and are specifically designed to interact with individual donors. Potentially, these small-domain LLMs can be extended to facilitate interaction with corporate donors.

Originality of the paper. *This research is an original attempt to analyze the user choice between traditional search engines and LLMs within the unique context of humanitarian organizations. Specifically, it investigates the crucial role that LLMs will have in shaping the digital promotion strategies that non-profit employ to obtain individual donations. While previous studies have concentrated on the donor decision-making process through traditional digital tools such as search engines and social media, this research investigates the consequences of the adoption of LLMs when donors look for information on non-profit organizations. LLMs will gradually substitute and integrate with traditional search engines, hence, non-profit fundraisers need to understand to which extent donors will adopt these tools and how they will influence their preferences and attitudes. This research investigates first-time and repetitive donors, thus, it attempts to appreciate how LLMs reshape the choices of diverse donor segments with varied approaches to humanitarian issues. As different causes are covered, it introduces original contextual dimensions to the investigation. This research is among the first to consider how users perceive the reliability of information provided by LLMs compared to traditional search engines and highlights the risks associated with a wide use of LLMs. In conclusion, as the study addresses the potential evolution of digital search methods and their implications for in the donation process, it provides relevant insights for academic literature and interesting suggestions for practitioners in the field of non-profit fundraising.*

Key words: *AI, Large Language Models (LLMs), Search Engines, Donor behavior, Fundraising strategies, Non-profit organizations*

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AI tra impatti di (post) management e decisioni verso trans-disciplinarietà e algoretica

LUCIANO PILOTTI[1]

1 - Applicazioni dell'AI e dimensioni tecno-organizzativa e decisionale: verso una razionalità sostenibile e trans-disciplinare dal linguaggio naturale?

Le applicazioni dell'intelligenza artificiale sono estremamente varie e ricoprono un'ampia gamma di campi, rendendo quindi difficile un elenco completo ed esaustivo e definitivo ma certo gli impatti tecno-organizzativi e decisionali sono quelli che possono meglio indicarci il loro grado (atteso/inatteso) di desiderabilità sociale e umana (oltre che ambientale) e dunque anche - potremmo dire - il loro grado di razionalità strumentale e/o di obiettivo sia questa di tipo convenzionale, intuitiva o inventiva.

Attualmente la concezione predominante nello sviluppo di AI si concentra su sistemi che ci aspettiamo agiscano razionalmente che vanno tuttavia compresi. L'agire razionale implica una visione dell'intelligenza che non solo si limita alle capacità intellettuali, ma che è anche estesa ad una interazione efficace con l'ambiente circostante nella sostenibilità. Nel contesto presente, sembra di poter dire che l'attenzione è maggiormente posta sull'efficacia e sulla precisione dei risultati prodotti dai sistemi di AI piuttosto che sulla loro versatilità, adattabilità e sostenibilità. Tanto che ci si concentra prevalentemente sullo sviluppo di sistemi altamente specializzati per applicazioni specifiche "inseguendo l'esistente" per esplorarne la "sostituzione", piuttosto che sistemi di intelligenza generale che possono operare in contesti più ampi e integrati secondo logiche di versatilità, adattabilità e sostenibilità. Infatti, una possibile categorizzazione delle aree applicative dell'AI include diversi ambiti specifici dei quali possiamo riprendere alcuni casi esemplificativi.

Per esempio possiamo partire dalla pianificazione autonoma di attività e operazioni, particolarmente importante in settori come la produzione industriale e la logistica, ma anche in alcuni contesti più avanzati come l'esplorazione dello spazio. I sistemi di AI che vengono sviluppati in questo campo sono in grado di avere un focus definito come obiettivo generale, per generare poi un piano costituito da una sequenza di operazioni-processi per raggiungere l'obiettivo, ed infine di monitorare l'esecuzione di tale piano e i risultati raggiunti per eventuali aggiustamenti successivi in un circolo virtuoso di affinamento.

Nel campo dei giochi, gli studi effettuati hanno avuto un impatto significativo, con l'uso di tecniche per la ricerca nello spazio degli stati. Un caso emblematico - citato diffusamente in letteratura - riguarda la vittoria del supercomputer Deep Blue di IBM[2] sul campione mondiale di scacchi Garry Kasparov nel 1997, dimostrando quanto l'AI possa essere potente in ambiti competitivi.

Con riferimento al controllo autonomo, vi sono invece risultati promettenti nell'ambito del controllo di sistemi complessi, come nel caso della guida autonoma di veicoli e nel controllo delle sonde spaziali che necessitano di capacità autonome di adattamento rispetto alle prime macchine spaziali (navicelle e stazioni orbitanti o satelliti geo-stazionari) degli anni 60 e 70 del secolo scorso.

La dimostrazione automatica di teoremi matematici e la programmazione automatica rappresentano altre aree tradizionalmente influenzate dall'AI, nelle quali ci si occupa di complessi problemi teorici e metodologici. Più di recente, la ricerca si è soffermata sullo sviluppo di tecniche inferenziali che consentano di dedurre nuovi fatti da un insieme di dati attuali, influenzando così la progettazione dei sistemi esperti e dei sistemi di domanda e risposta capaci di costruire catene auto-regolate di adattamento e ricerca dell'equilibrio in condizioni instabili e variabili.

Se guardassimo alla robotica e alla visione artificiale scopriremmo che sono settori immersi in mondi multidisciplinari e che utilizzando strumenti di AI possono integrare molteplici altre discipline in modo trasversale, come la meccanica, l'elettronica e l'ingegneria dei sistemi e ormai anche la bio-chimica. Campi che spingono verso la trans-disciplinarietà e ibridandosi mirano a creare macchine autonome in grado di svolgere compiti integrati che fino a pochi anni fa richiedevano l'intervento o la mediazione dell'uomo. Un esempio significativo è il veicolo autonomo Stanley, che nel 2005 ha completato con successo una gara nel deserto del Mohave, dimostrando il potenziale della robotica intelligente in condizioni estreme come quelle che potremmo trovare su altri pianeti ad esempio sulla Luna, o su Marte o Venere.

Una ulteriore applicazione dell'AI dai sorprendenti sviluppi è l'elaborazione del linguaggio naturale; un'area estremamente complessa, che si occupa di problemi legati alla comprensione e alla generazione di espressioni

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2 Nilsson, N. J. (2009). *The quest for artificial intelligence: A history of ideas and achievements*. Cambridge University Press.

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linguistiche da parte delle macchine simulando il linguaggio naturale e umano e che già ritroviamo in parte nei chatbot come Alexa o Siri. Nonostante in questo campo siano stati fatti numerosi progressi, rimangono ancora molti punti interrogativi. Tuttavia, se il potenziale applicativo di queste ricerche è molto promettente per ora si pensa solo a miglioramenti incrementali e in un futuro prossimo a salti più robusti di stato e di potenza tenendo conto delle enormi esigenze energetiche di questi strumenti come primo limite di fondo da "superare" che dovrà accompagnarsi ad un salto ancora più forte in relazione alla trans-disciplinarietà di cui necessita per potere esprimere tutto il suo potenziale.

Infatti, i sistemi esperti e le ontologie rappresentano una parte fondamentale dell'ingegneria della conoscenza e per tale motivo hanno un impatto significativo nella modellazione della conoscenza per l'AI, particolarmente nell'ambito del web e delle applicazioni nell'organizzazione industriale , organizzativa e/o dei servizi da remoto[3].

E' dunque evidente anche da questo pur limitato richiamo ai mondi delle applicazioni che l'intelligenza artificiale rappresenta un enorme potenziale ancora del tutto da esplorare in profondità essendoci per ora mossi sulla sua superficie, ma avendone colta la sua forza trasformativa per le organizzazioni sostenibili moderne tra limiti, opportunità e grandi sfide epocali. L'AI sta rivoluzionando il modo in cui le aziende operano, producono, decidono e cambiano richiedendo un completo ridisegno delle loro strutture organizzative, dei processi decisionali e della cultura aziendale e di interazione con l'utente finale e/o intermedio. Il primo salto è quello dell'integrazione dell'AI nei modelli operativi e che porta con sé numerosi cambiamenti, tra cui un ripensamento delle catene di approvvigionamento, l'automazione di processi complessi e la necessità di sviluppare nuove competenze e infrastrutture, soprattutto in chiave trans-disciplinare e a partire dalla doppia transizione digitale e di sostenibilità. E' Accenture[4] a segnalare che - differentemente da quanto si riteneva solo pochi anni fa - l'AI consente di automatizzare non solo i processi ripetitivi, ma anche attività più complesse, sia riducendo i costi delle operazioni e sia migliorandone l'efficienza. Tuttavia, per far si che il potenziale dell'AI sia massimizzato, McKinsey & Company[5] sottolinea l'importanza di riorganizzare le strutture aziendali per rendere più coesiva la collaborazione tra dipartimenti e la creazione di team interdisciplinari (o meglio, trans-disciplinari) che ci sta conducendo velocemente al superamento del tradizionale modello funzionalista o neo-taylorista di stampo gerarchico nato sul finire dell'800 e primi del '900 con le prime catene di montaggio sperimentate nel settore automotive da Herny Ford che porteranno peraltro alla prima grande rivoluzione degli orari di lavoro scendendo dalle 60-80 ore medie (quale soglia insuperabile per il conflitto con le capacità e la fisiologia umane oltre che con l'efficienza e l'etica) alle 40 ore settimanali del primo decennio del "secolo breve" che sono ancora quelle oggi più diffuse e che darà inizio all'integrazione tra il paradigma meccanico con quello della prima automazione del sistema di fabbrica in connessione con la sua completa elettrificazione nell'illusione di potere "sostituire" allora (forse) come ora il lavoro umano lungo le linee del controllo gerarchico e funzionale della organizzazione produttiva scandita dai tempi dell'orologio e adattata allo spazio-tempo come nello smart working o viziosamente nella gig-economy.

L'adozione dell'AI sta portando ad impatti non assimilabili a quel salto paradigmatico della seconda e terza rivoluzione industriale per la forte domanda di creazione di nuovi ruoli inter-disciplinari e inter-funzionali enormemente dinamici e in forma di team-work nel potenziamento di dynamic capabilities[6] cambiando anche il top management come il Chief AI Officer (CAIO), l'AI ethicist e il CHO-Chief Happiness Officer che in generale richiedono un forte adattamento per quanto riguarda la gestione delle risorse umane, prestando particolare attenzione agli investimenti formativi del personale da integrare con Piani di Welfare aziendali e territoriali per un superiore livello di work life balance lungo linee di modelli partecipativi più capaci di resilienza e adattamento. Gartner[7] evidenzia infatti che l'AI potenzia decisamente le decisioni umane, migliorando la capacità di analizzare grandi volumi di dati e prendere decisioni più informate e tempestive ma con un forte coinvolgimento delle persone. Infatti, l'implementazione dell'AI necessita di un grande cambiamento culturale, ovvero la leadership deve guidare l'uso dell'AI non solo per l'efficienza operativa, ma

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3 Enciclopedia Italiana Treccani. (n.d.r.). Intelligenza artificiale. In *Enciclopedia della Scienza e della Tecnica*.
Russell, S., & Norvig, P. (2010). *Artificial intelligence: A modern approach* (3rd ed.). Prentice Hall.

4 Accenture è una multinazionale di consulenza gestionale, servizi tecnologici e outsourcing, con sede a Dublino, Irlanda. È particolarmente nota per il suo lavoro nell'integrazione di tecnologie emergenti, come l'intelligenza artificiale e il cloud computing, per aiutare le organizzazioni a migliorare l'efficienza operativa e a innovare nei loro rispettivi settori.
Fonte: Accenture. (n.d.). *AI in business: Unlocking value with artificial intelligence*.

5 McKinsey & Company è una società di consulenza manageriale globale, fondata nel 1926 e con sede a New York. È nota per il suo lavoro nel supportare le principali aziende e organizzazioni governative nell'ottimizzazione delle strategie aziendali, nella gestione operativa e nell'adozione di tecnologie avanzate. Offre insight su tendenze economiche, industriali e tecnologiche a livello globale. Fonte: McKinsey & Company. (n.d.). *The state of AI in 2022—and a half-decade in review*.

6 Baravelli, Pilotti (2022), "Organizational Models and Dynamic Capabilities: From Burocratic Structures to a Freedom and Emotional Management for a Sustainable, Participative and Innovative Bank. The Case of Italian Banks", *Journal of Economics and Public Finance* Vol.8 n.4; vedi anche Pilotti (2019), *Organizzazioni Emotive (Creative e Intelligenti)*, Mc Graw Hill Italia. Autori che sviluppano l'idea che le ultime organizzazioni fordiste come le banche (o le grandi catene della GDO) stanno cambiando pelle e strutture entro modelli più organicisti e integrati che impongono linee meno gerarchiche e più partecipative motivando e includendo non solo per vie salariali (estrinseche) ma per vie intrinseche o motivazionali verso un superamento dell'efficienza statica con approcci adattativi e resilienti e un miglioramento della produttività cognitiva.

7 Gartner è una delle principali società di ricerca e consulenza al mondo, specializzata in tecnologie dell'informazione (IT). Fondata nel 1979, Gartner fornisce analisi, consulenza strategica e strumenti di benchmarking per aiutare aziende e organizzazioni a prendere decisioni informate in ambito tecnologico. Fonte: Gartner. (n.d.). *The AI advantage: Making artificial intelligence work in your business*.

anche per esplorare nuove opportunità di crescita adattativa e resiliente. Quindi la gestione del cambiamento diviene uno degli aspetti più strategici modellando organizzazioni capaci di adattamento per un'adozione efficace e diffusa dell'AI lungo tutto l'organismo organizzativo. Del tutto comprensibile - anche secondo il Boston Consulting Group (BCG)[8] - la necessità di sviluppare una governance solida per garantire che l'AI sia allineata agli obiettivi strategici e che i benefici siano distribuiti in modo equo e condiviso in tutta l'organizzazione per una crescita di lungo periodo. La logica strategica dunque tenderà a bilanciarsi con quella organizzativa non più da considerare in senso ancillare anche rispetto al top management che evolve velocemente verso logiche di coach uscendo definitivamente dalle tradizionali logiche del controllo top-down secondo linee di auto-organizzazione.

L'integrazione trans-disciplinare dell'AI non solo trasforma i processi aziendali, ma necessita anche di un significativo aggiornamento delle competenze in continuo all'interno dell'azienda verso un nuovo bilanciamento dinamico tra strategia e organizzazione. Infatti, come evidenziano diverse indagini riprese da MIT Sloan Management Review [9], le aziende devono investire nella formazione dei loro dipendenti perchè siano in grado di sviluppare competenze specifiche nell'ambito dell'AI, come la comprensione degli algoritmi di machine learning, di deep learning e data analysis, integrate nelle dynamic capabilities come capacità di team-work allargati e integrati nella trans-disciplinarietà con tecnologie avanzate. Questo processo include la creazione di programmi di formazione dedicati e personalizzati sia orizzontali che verticali per una maggiore integrazione della conoscenza e l'adozione di una mentalità e di una cultura dell'apprendere-ad-apprendere, essenziale a mantenere il personale allenato al cambiamento e all'adattamento per la resilienza dove la tecnologia fa da collante organicista di una company community. Dunque siamo anche in presenza anche di un nuova categoria di lavoro che dal mestiere ottocentesco pre-industriale evolve prima in lavoro come esecuzione rigida e burocratica governato dalla gerarchia e successivamente trasformandosi in competenze sorgenti da condizioni prestazionali trasferibili per poi evolvere verso capacità[10]. Lavoro come capacità che si libera allora dalla "gabbia prestazionale" di stampo weberiano e funzionalista vestendosi di principi auto-organizzativi e di team-working come dynamic capabilities che si fondono nella costruzione di organizzazioni resilienti dove l'efficienza statica è accoppiata da capacità adattative ai cambiamenti interni ed esterni, di community e di networking entro un dinamico e partecipativo organicismo capace di fronteggiare il cambiamento continuo e l'incertezza portando le persone anche ad assumere capacità di rischio, individuale e collettivo, con il supporto e di ruoli aperti nell'uso di AI per contaminazioni e ibridazioni continue.

Un contesto fluido che richiede nuove responsabilità alle persone e una diversa cultura etica da parte dell'impresa-community verso algoretica.

2. AI e decisioni di marketing digitale tra *predittività e predeterminazione* delle scelte

Abbiamo visto che il frutto degli algoritmi anche se "incapaci di pensare naturalmente" è quello di predire in modalità sempre più affinate sulla base della loro capacità di apprendere (o di essere allenati) da miliardi di testi "revisionati" in precedenza secondo la sequenza della scoperta di quale parola abbia la maggiore possibilità di seguire o anticiparne un'altra in una lunghissima stringa quasi infinita con possibilità di retroazione e allineamento in continuo. Imparando peraltro moltissimo sulle singole persone che la usano per gli scopi più disparati di scelta tra canzoni e brani musicali (Spotify), libri, film (Netflix), video altamente virali (Tik Tok), ricette di cucina. Ma la specifica piattaforma alimentata da AI non agisce solo ex-post al tempo t+1 ma diviene in grado di connettere il singolo profilo di una specifica persona X con le sue scelte di portafoglio Y potendone anticipare i desideri e le aspettative Z al tempo t-1 e dunque potendole anche predeterminare. Agendo non solo su scelte standard di film o canzoni ma su informazioni sensibili come le preferenze sessuali, religiose o quelle politiche e culturali e a questo "stadio del processo" interviene lo spazio di manipolazione che nella fase precedente di scelta è solo indiretta e con un portafoglio dato. L'agire che normalmente viene affidato agli amici più intimi, al compagno di squadra o alla/al fidanzata/o oppure alla moglie/marito qui viene

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8 Boston Consulting Group (BCG) è una delle più importanti società di consulenza strategica a livello mondiale, fondata nel 1963. BCG è riconosciuta per il suo approccio innovativo alla risoluzione dei problemi aziendali, offrendo consulenza su strategie di business, gestione del cambiamento, innovazione e *digital transformation* . L'azienda è famosa per i suoi modelli analitici, come la matrice BCG, e per le sue approfondite ricerche su tendenze economiche e industriali globali. Fonte: Boston Consulting Group (BCG). (n.d.). *AI and the new digital economy: Powering transformation with artificial intelligence.*

9 MIT Sloan Management Review è una prestigiosa rivista accademica e di business pubblicata dal Massachusetts Institute of Technology (MIT). Fondata nel 1959, la rivista si concentra su temi legati alla gestione, all'innovazione e alla trasformazione digitale, con un focus particolare sull'impatto delle nuove tecnologie e delle strategie aziendali moderne. È nota per le sue ricerche approfondite e per offrire insight avanzati su come le aziende possono affrontare le sfide globali e cogliere le opportunità emergenti nell'economia digitale. Fonte: MIT Sloan Management Review. (n.d.). *How AI is changing business: Talent, technology, and transformation.*

10 *Capacitazione* come evoluzione del lavoro da una rigida cornice definitoria che transita in 250 anni dal mestiere artigiano pre-industriale al lavoro esecutivo industriale parcellizzato fino alla competenza auto-prestazionale individualizzante nel senso proposto da Amartja Sen quale estensione delle capacità auto-organizzative e di obiettivo che ripone al centro dell'organizzazione l'uomo, il team-work e la sua community, ridefinendo i rapporti fra l'impresa e l'ambiente con pratiche di sostenibilità per la resilienza.

assunto dal fornitore di servizi digitali on-line come avvenuto finora per i consigli per gli acquisti e lungo pratiche esperienziali di prossimità con il tipico word-of-mouth. E' tuttavia evidente che in questo caso viene messa a rischio la nostra capacità di autodeterminazione e il nostro diritto alla libertà nella privacy che deve conseguire da una adeguata protezione dei dati e da una appropriata sorveglianza.

Questa transizione dalla semplice predittività alla predeterminazione - o se si vuole ad una super/predittività - avviene a ridosso di tre snodi fondamentali che riguardano la "memoria" di Chat-Gpt che richiamiamo sinteticamente con una intelligenza artificiale che:

A - risponde a domande simulando quelle che farebbe un umano e in linguaggio naturale adattandole ad uno specifico user o target;

B - ha la "capacità di ricordare" informazioni (con parole, immagini, forme e suoni) molto dettagliate sull'interlocutore dal quale riceve domande e con il quale ha attivato una conversazione (compreso lo stile di guida su una strada o di insegnamento in una aula, oppure di scrittura di un romanzo);

C - è dotata di una memoria che tuttavia può essere "disattivata" in termini di personalizzazione, come se cancellassimo la cronologia delle attività di search engine che ormai conosciamo a fondo per qualsiasi device.

Seppure una tale intelligenza non abbia alcuna consapevolezza di sé, attraverso questa capacità di memoria "focalizzata" Chat-Gpt può disegnare con una certa precisione carattere, ambizioni, tratti della personalità, fino a rilevare tick nervosi o del linguaggio e anche patologie (espresse o inespresse) di tutti noi sia nelle attività di studio, lavoro, di scelta in un supermercato o di relax su una spiaggia e dunque indirettamente segnalando anche il contesto nel quale tutti questi comportamenti avvengono. Dunque una AI che potrebbe segnalare di noi aspetti e dimensioni del carattere e delle modalità di scelta che noi stessi non conosciamo e in grado di rispondere alla domanda "cosa sai di me che io non so?" trasformando la favola di Biancaneve e della strega davanti allo specchio ("specchio specchio delle mie brame chi è la più bella del reame") una realtà per niente immaginifica o fantastica ma molto concreta, simulando "stati del carattere nel riconoscimento facciale e/o nel linguaggio del corpo".

Del tutto evidente allora che siamo di fronte a grandi opportunità ma anche ad enormi rischi che le pratiche e le strategie di marketing proveranno a discernere selezionando quelle compatibili con il proprio core business e il proprio branding così come con la propria value proposition nel rispetto della protezione dei dati e della privacy degli utenti lungo una traiettoria di responsabilità consapevole. E tuttavia visti i rischi di deformazione (volontaria o involontaria) e di fake è altrettanto evidente che ci serviranno regole adeguate per guidare queste scelte aziendali e manageriali innanzitutto proteggendo i dati e la privacy degli utenti che è il compito primario del Garante Europeo per la Protezione dei Dati[11] verificando il rispetto delle risoluzioni dei vari AI Act, Digital Markets Act e Digital Services Act promulgati dalla Unione Europea negli ultimi due anni e prima fra i grandi player globali verificandone i livelli di responsabilità nel trattamento dei dati personali e aziendali[12]. Confermando che i dati sono il petrolio del futuro e per questo la corsa al loro utilizzo va "regolata e canalizzata" evitando usi impropri e abusi di posizione dominante che potrebbero violare le regole della concorrenza e frenare i processi innovativi o più semplicemente evitando che l'AI possa condurci verso un "potere (che) ci possa (voglia) addomesticare"[13] magari associato ad una sostenibilità che sia solamente economica (e ineguale) e non anche sociale e ambientale e tesa a ridurre le diseguaglianze[14].

3. Pratiche di marketing alla prova dell'AI e della trans-disciplinarietà

Negli ultimi 30 anni abbiamo assistito ad ambienti di mercato e comportamentali sempre più fluidi ed incerti tanto da spingere fortemente la digitalizzazione dei prodotti con robuste iniezioni di servizi (serviticing) che "vestono e veicolano" i prodotti in modi differenziati e sempre più adattivi per ottimizzarne l'interazione continua con la clientela e far avanzare lo sviluppo del prodotto in relazione ai cambiamenti di preferenze e gusti oltre che di contesti di mercato sempre più globalizzati accelerando la catena di feedback, test e prototipazione. Mutando in questo modo le esigenze dell'organizzazione verso una maggiore agilità (agile organization) caratterizzata da inter-funzionalità e ibridazione di competenze oltre che di iniezione di virtù e di etica della responsabilità (nel dialogo tra marketing manager , product

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[11] Wojcieh Wiewiorowski è il *Garante Europeo per la Protezione dei Dati* che ha il compito di difendere il rispetto della privacy e della protezione dei dati rispetto a qualsiasi legge UE ed ha espresso recentemente (2024) l'idea largamente condivisa che gestire l'intelligenza artificiale e assegnarvi regole non è tanto porsi dal punto di vista dei diritti fondamentali, ma principalmente assumere la prospettiva della sicurezza dei prodotti e dei servizi ossia per qualcosa che deve funzionare sul mercato e deve produrre specifici vantaggi. Al Garante spettano sia le funzioni di sorveglianza del buon funzionamento dei mercati e sia le funzioni di protezione dei dati in merito all'uso dell'AI e alle soluzioni che vengono proposte dai vari player globali e che operano dentro i confini europei facendoli anche dialogare e interagire e in particolare tra scienza e industria a salvaguardia del "bene comune" in tutti i settori nei quali viene prodotta e usata l'AI e che avvenga con procedure trasparenti.

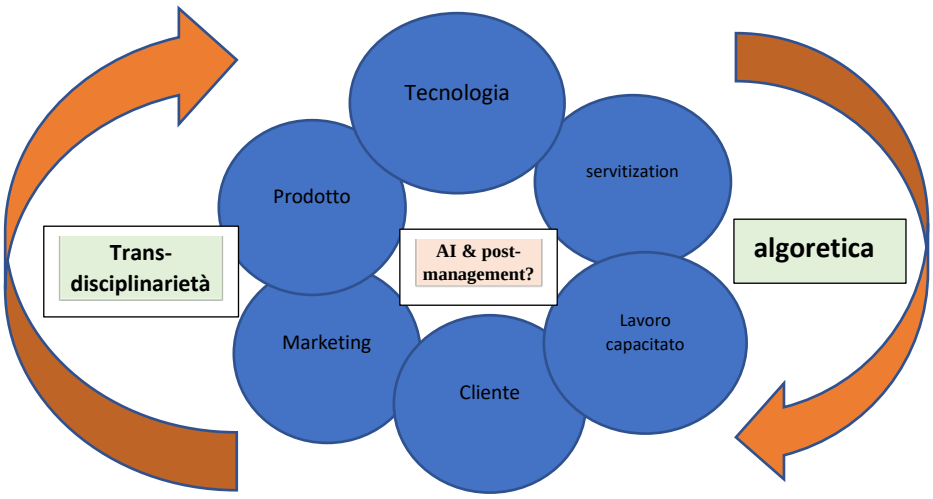
[12] Derme A. (2024), *Marketing – La gestione del marketing mix nell'era dell'Intelligenza Artificiale*; McGraw Hill Italia

[13] Guardando ai processi di riforma avviati in Italia dalla maggioranza di estrema destra al Governo rinviamo a: G.Zagrebelsky, A.Spataro e F.Pallante (2024), *Loro dicono, Noi diciamo – su premierato, giustizia e regioni*; Laterza. Che ci spiegano in dettaglio la distinzione tra "Governo" e "governabilità" e al ruolo del potere in una democrazia matura dove lo Stato di Diritto divide i poteri per renderli "vaccinati" dalle pulsioni all'"assolutismo delle maggioranze" che quella divisione vorrebbe invece forzare deformando la democrazia e dei quali abbiamo esempi tragici in tutto il novecento e anche negli primi 25 anni del XXI sec.

[14] Pilotti (2019*), Organizzazioni emotive (creative e intelligenti)*; McGraw Hill; inoltre Pilotti, Rinolfi (2022), *Management e Governance dell'ambiente e valorizzazione delle risorse naturali e umane* (Voll.1 e 2); Wolters Kluwer

manager e user) entro un lavoro che evolve verso capacità cooperative senza perdere tensione competitiva verso la convergenza di finalità comuni triangolando strategie d'impresa a quelle di marketing e di prodotto in modo più stringente e circolare nel disegno dell'esperienza di consumo attraverso la malleabilità delle risorse digitali. Tanto che branding, posizionamento, informazione sulla clientela e segmentation si saldano con la CRM nell'attrazione, acquisizione della clientela e nel suo trattenimento entro i perimetri aziendali fidelizzando. L'esperienza di consumo diventa dunque altamente fisica e digitale insieme (phygital) coniugando e allineando marketing (riconoscibilità del marchio verso acquisto) e prodotto (coinvolgimento, ottimizzazione, esperienza post-acquisto) riducendo fattori di frammentazione e sub-ottimizzazione. Venendosi a comporre allora la triangolazione virtuosa tra Marketing, Prodotto e Tecnologia integrando il Cliente con l'agile organization supportata da agile marketing.[15] La tecnologia e l'AI in particolare con la gestione dei dati su clienti (e fornitori e canali) supporta sia il marketing che il prodotto consolidando dynamic capabilities, inter-funzionali e inter-disciplinari spostando l'asse delle competenze verso trans-disciplinarietà[16] e mutando la stessa natura del lavoro verso capacità e imponendo regole condivise di un quadro algoretico (cfr. Schema 1) La tecnologia e in particolare l'AI divengono leve di allineamento tra obiettivi aziendali ed esigenze della clientela verso una organizzazione più piatta e responsiva ossia più adattativa e dunque più resiliente, responsabile e sostenibile. Vediamo intanto alcuni impatti sulle pratiche e decisioni di marketing in senso stretto considerando che «l'ampio utilizzo di internet ha portato il marketing di prodotti o servizi sulle piattaforme online rendendo essenziale per i brands ottenere visibilità e riconoscimento a livello globale»[17]. Questo fenomeno rientra nell'ambito del marketing digitale, ossia un vasto insieme di strategie e tecniche che sfruttano molteplici canali digitali per la promozione di prodotti, servizi e marche, con l'obiettivo di coinvolgere i consumatori in maniera diretta, efficace e personalizzata. Questo approccio ha rivoluzionato il modo in cui le aziende si relazionano con il pubblico, consentendo una comunicazione mirata ed immediata. Questo cambiamento è particolarmente evidente nei processi di targetizzazione e segmentazione del pubblico. Infatti, tradizionalmente, le aziende tendevano a lanciare campagne pubblicitarie a un pubblico ampio, sperando che il loro messaggio raggiungesse i potenziali clienti. Tuttavia, con l'avvento del marketing digitale, è emersa la capacità di segmentare il pubblico in gruppi più specifici e mirati, in base a criteri psico-comportamentali, demografici e geografici. Questo nuovo approccio ha permesso alle aziende di personalizzare le loro comunicazioni, creando messaggi più pertinenti e rilevanti a ciascun segmento di pubblico profilandone meglio le preferenze nel tempo e nello spazio.

Schema 1 - Fattori di management e AI tra algoretica e trans-disciplinarietà



Tra le principali attività del marketing digitale rientrano - come noto - la pubblicità sui media, che permette di raggiungere target specifici in base a interessi e comportamenti, l'email marketing, utilizzato per mantenere un contatto costante con i clienti attraverso l'invio di messaggi promozionali personalizzati, e la SEO (Search Engine Optimization). Quest'ultima si concentra sull'ottimizzazione dei contenuti di un sito web per migliorare la sua posizione nei risultati organici dei motori di ricerca (SERP, Search Engine Results Page), come Google. Questo tipo di ottimizzazione avviene attraverso l'uso di keywords, ossia parole o frasi che gli utenti digitano nei motori di ricerca per trovare informazioni specifiche. Una strategia efficace per le parole chiave è essenziale poiché costituisce il legame diretto tra le query degli utenti e il contenuto presente su un sito web. Quando un'azienda seleziona parole chiave rilevanti e frequentemente ricercate nel suo settore, aumenta significativamente le possibilità di comparire tra i primi risultati dei motori di ricerca, il che si traduce in un incremento della probabilità di clic e di visite al sito (Cfr. Fig.1).

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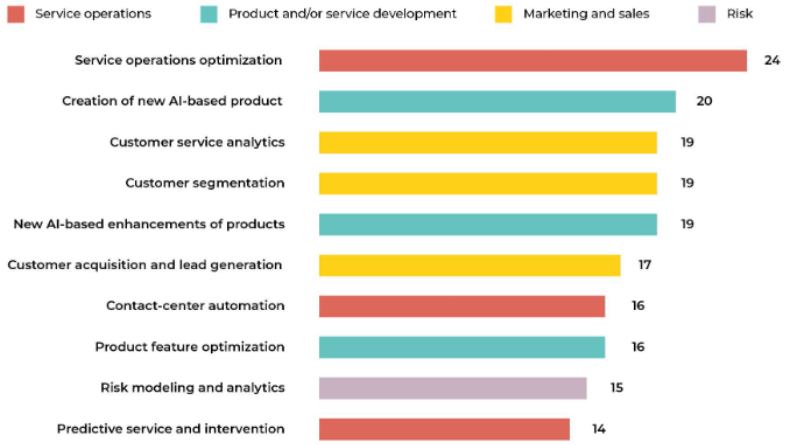
15 Neil Perkin (2023), *Agile Marketing – rapidità, efficienza e controllo per il marketing team di domani*; Guerini Next, pp.46-48
16 Baravelli, Pilotti, *Dynamic Capabilities*…, cit.
17 Davenport, T., Guha, A., Grewal, D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. Journal of the Academy of Marketing Science, 48(1), 24–42.

In questo contesto, l'avvento dell'intelligenza artificiale (AI) ha ulteriormente rivoluzionato il settore. L'AI, infatti, ha trasformato estremamente il branding e il marketing, rendendo queste discipline più dinamiche, personalizzate e orientate ai dati. Grazie alla combinazione AI, big data e machine learning, le aziende possono creare strategie di marketing sempre più ottimizzate e maggiore coinvolgimento con i consumatori. I big data, ossia quell'insieme di dati raccolti, così vasti e complessi, da avere bisogno delle nuove tecnologie, come l'intelligenza artificiale, per venire processati, rappresentano una risorsa essenziale per comprendere le preferenze e i comportamenti dei consumatori[18]. L'AI utilizza questi dati, individuando schemi e tendenze che orientano le aziende nella realizzazione di campagne più specifiche e mirate. Questo avviene attraverso il processo di machine learning, ossia una branca dell'IA che sviluppa sistemi in grado di apprendere dai dati e migliorare le proprie prestazioni nel tempo e che ci interroga su prospettive di post-management.

Fig. 1: Utilizzi più popolari dell'AI da parte dei marketers



Fonte: McKinsey, 2022

Le aziende, attraverso l'uso dell'AI, dei big data e del machine learning, creano modelli predittivi che riassumono le informazioni e amplificano la loro significatività in relazione agli obiettivi di business, traducendoli in dati utili per azioni concrete, da usare per progettare strategie di mercato responsive di medio-lungo termine accrescendo il capitale reputazionale e semantico oltre che umano e sociale[19]. Sostanzialmente, lo scopo di un modello predittivo è quello di identificare automaticamente le relazioni all'interno dei dati per prevedere le future tendenze del mercato e gli stessi comportamenti dei clienti[20], fornendo così alle aziende una visione più chiara dell'andamento del mercato e delle sue possibili evoluzioni nel tempo accrescendo la competitività dei propri prodotti e servizi.

L'AI ha anche rivoluzionato l'uso delle keywords nella SEO. Infatti, i recenti progressi dell'intelligenza artificiale hanno completamento cambiato la ricerca di marche utilizzando parole chiave o ricerca vocale[21]. I motori di ricerca, grazie alle tecnologie di elaborazione del linguaggio naturale, ora sono in grado di capire il contesto e l'intenzione dietro le query immesse dagli utenti, permettendo di fornire risultati più pertinenti. Per questo motivo, le aziende devono creare contenuti che rispondano in modo preciso alle domande e ai bisogni degli utenti, migliorando così la loro visibilità nei risultati di ricerca. Questo richiede un'attenzione particolare alla qualità e alla rilevanza del contenuto, anziché concentrarsi sulla quantità. Le aziende devono, quindi, impegnarsi nella creazione di articoli, guide e risorse che non solo catturino l'interesse degli utenti, ma che forniscano anche risposte complete e approfondite alle loro domande e dunque ai loro bisogni in modo costante e continuo per migliorare e sfruttare la fidelizzazione che ne discende.

L'intelligenza artificiale ha inoltre trasformato le modalità in cui le persone effettuano le ricerche, soprattutto grazie alla diffusione di dispositivi vocali come Alexa (sviluppato da Amazon) o Google Assistant. Strumenti (anche vocali) che permettono agli utenti di interagire con la tecnologia in una maniera più intuitiva e naturale, rendendo la ricerca vocale una alternativa sempre più diffusa. A differenza delle query di ricerca scritte, che sono tendenzialmente brevi e dirette, la ricerca vocale si distingue per l'utilizzo di frasi più lunghe e colloquiali, decisamente più empatiche. Ovviamente, questa evoluzione richiede alle aziende di rivedere le proprie strategie SEO per adattarsi alle nuove modalità di ricerca ed interazione. Per garantire che i contenuti siano visibili e rilevanti, è necessaria ottimizzare i siti web in modo da rispondere efficacemente a domande formulate con un linguaggio naturale. Questo implica l'inserimento di parole chiave strategiche e la creazione di contenuti informativi e di valore che rispondano in modo diretto alle domande degli utenti e al loro sistema di valori. Perché il marketing contemporaneo è orientato al purpose e richiede crescente responsabilità e identità. Che significa in primo luogo assumere focalizzazione su questioni sociali, ambientali e/o culturali e ridefinire

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18 Big data: definizione, benefici e sfide (infografica), Parlamento Europeo, ultima consultazione 10/10/2024
19 Randaccio C. (2015), Trattamento del dato, Processi decisionali e trattamento dei dati, p. 38-39
20 Idem Randaccio C. (2015), p.39-40
21 Yoganarasimhan, H. (2014). *Search Personalization*;

al meglio e in secondo luogo l'identità che si vuole promuovere sul mercato "lasciando il segno nella vita delle persone" suscitando emozioni, coinvolgendo, evadendo dalla quotidianità o risolvendo problemi. Dunque mixando i saperi main stream del marketing manager che deve essere sempre più capace di maneggiare conoscenze di psicologia, di sociologia, di geopolitica, ma anche ambientali, di neuroscienze oltre che essere competenti di tecnologia, AI e inoltre di etica in una chiave eco-sistemica riunificando quei saperi che il marketing degli anni '70 e '80 del secolo scorso avevano separato o escluso. Fattori che ci spingono a connettere radicalmente approcci trans-disciplinari e algoretica con modelli organizzativi più partecipati.

Ma la rivoluzione è solo iniziata!

The Trade-off Between Data Privacy and Personalization in the Financial Sector: Can Generative AI be a moderator in Gen Z's Investment Decisions?

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Abstract

The increasing digitization of financial services has amplified the trade-off between personalized offerings and data privacy. While tailored investment recommendations provide significant advantages to investors, especially those that are Generation Z individuals (GZIs), concerns over data security, fraud and potential misuse persist. In parallel, it accelerates the tertiarization of the sector, shifting the focus from traditional banking institutions towards an AI-driven financial ecosystem. This study explores the role of Generative AI (GAI) as a moderator in this balance, analyzing how it can facilitate investment decisions without compromising privacy. Through qualitative interviews with ten American GZIs (five males, five females), the findings suggest that while this cohort is generally inclined to share personal data for personalization, financial decision-making presents unique challenges, such as the need for human interaction in finalizing financial decisions and different feelings regarding traditional and digital banks. GAI emerges as a key enabler, providing investment insights through synthetic data generation and federated learning, ensuring both personalization and privacy. The study contributes to financial technology research by highlighting GAI's potential in reshaping investment advisory services.

Framing of the research. *The rapid digitalization of the financial sector has revolutionized how financial services are delivered, with artificial intelligence (AI) playing an increasingly central role in investment decision-making and personalized financial advising (Mavlutova et al., 2020). One of the most critical challenges in this transformation is balancing personalization and data privacy (Oyedokun, 2025). While highly customized financial services offer significant advantages to consumers, particularly younger digital-native generations (e.g., Generation Z individuals or GZIs), concerns about data security, regulatory compliance, and ethical implications persist. The trade-off between personalization and privacy has thus become a defining issue in contemporary financial service offering (Eko Retno et al., 2023).*

Financial institutions increasingly rely on predictive analytics and AI to tailor their services to individual investors. Personalized investment strategies leverage large datasets to assess risk tolerance, market trends, and user preferences, enabling financial firms to optimize asset allocation and risk management. However, achieving this level of customization often requires extensive access to personal financial data, raising concerns about data misuse and compliance with stringent regulations or Authorities, such as the Consumer Financial Protection Bureau (CFPB) in the US (Birkenmaier, 2024).

The personalization-privacy trade-off is particularly pronounced in the financial sector due to the sensitivity of the data involved. Unlike other domains where users are willing to exchange data for convenience (e.g., targeted advertising), financial information is inherently more confidential (Alhawamdeh et al., 2024).

Generative Artificial Intelligence (GAI) has the potential to reshape how financial services balance personalization and privacy. Unlike traditional AI models that rely on direct access to raw user data, GAI leverages synthetic data generation, differential privacy techniques, and federated learning to deliver personalized insights without exposing sensitive information (Chatterjee et al, 2023). This allows financial institutions to offer customized investment recommendations while minimizing privacy risks. Indeed, GAI can analyze vast amounts of financial data, detect emerging market trends, and provide tailored investment suggestions. Moreover, techniques such as synthetic data generation enable AI systems to create anonymized datasets that preserve patterns and trends without compromising individual privacy. This approach ensures that financial institutions can harness the benefits of personalization without direct access to identifiable user data. Furthermore, it accelerates the tertiarization of the sector, shifting the focus from

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traditional banking institutions towards an AI-driven financial ecosystem. Another advantage of GAI in financial services is its ability to enhance financial literacy. This educational function is particularly valuable in fostering long-term financial independence while ensuring that privacy remains a top priority (Philippas & Avdoulas, 2021).

Purpose of the paper. *The purpose of this research is to explore how GZIs perceive the role of AI in financial decision-making and, specifically, the role of GAI as a moderator of the trade-off between personalization and privacy in the context of financial services.*

As financial institutions increasingly utilize AI to personalize investment strategies, a critical challenge arises: balancing the benefits of highly tailored services with the privacy concerns associated with sensitive financial data. GZIs, often characterized as the first true digital-native cohort (Fulco & Aquilani, 2023; Rossi et al., 2023), is accustomed to AI-driven recommendations in various domains, from entertainment to e-commerce. In financial services, however, their attitudes towards AI-driven personalization are more nuanced. While they generally appreciate tailored recommendations, they are also highly aware of data privacy risks, particularly in an era of increasing data breaches, fraud and cybersecurity threats (Oberoi & Puranik, 2024).

This research investigates how GAI, through privacy-preserving techniques like synthetic data generation, federated learning, and differential privacy, can address these concerns while still offering tailored investment recommendations (Long et al., 2020).

Moreover, this research proposal is particularly compelling due to the fact that many individuals within this cohort are first-time investors, often possessing limited experience in managing financial assets. As such, AI-driven education and guidance offer a significant opportunity to bridge this knowledge gap. GAI-powered virtual financial advisors, for instance, have the potential to provide scenario-based simulations that can assist young investors in understanding complex concepts such as risk-reward trade-offs, portfolio diversification, and the intricacies of making informed investment decisions.

Methodology. *To gain a comprehensive understanding of Generation Z's perceptions of the trade-off between privacy and personalization in financial services, with particular emphasis on the role of GAI, a qualitative, inductive, and exploratory approach was employed. This method was selected to uncover emerging insights without the constraints of prior predefined assumptions. This allowed for a comprehensive examination of participants' experiences and perceptions, fostering a contextually rich understanding of their perspectives on privacy concerns and the role of AI in financial decision-making.*

As the chosen data collection method, semi-structured in-depth interviews were conducted to facilitate a flexible and open-ended exchange between the interviewer and participants. This approach enabled an in-depth exploration of the research topic while ensuring a structured focus on key thematic areas (Schreier, 2012). The interviews delved into participants' attitudes towards AI-driven personalization in financial services, their concerns about data privacy, and their thoughts on how GAI could affect this balance. Given the participants' familiarity with digital technologies, including AI, the semi-structured format was particularly effective in engaging them with both personal and broader reflections on the topic (Boyce & Neale, 2006).

The study targeted 10 American Gen Z individuals (5 males and 5 females) through purposive sampling to ensure a group that was representative of the cohort's characteristics and experiences. The selection of participants aimed to include individuals who were familiar with AI and had diverse attitudes toward financial services and technology. By interviewing an equal number of males and females, the study ensured gender balance, which is important for capturing a broader range of perspectives on this sensitive topic (Carson et al., 2001).

Participants were first asked to reflect on their experiences with AI and financial services in general. Questions focused on their familiarity with AI in various contexts, such as entertainment or e-commerce, and how those experiences shaped their expectations of AI in financial decision-making. One key question was: "How comfortable are you with AI making personalized investment recommendations for you?" Participants were then asked to consider the trade-off between personalization and privacy, with questions like: "What are your concerns about sharing personal financial data with AI systems?" and "How do you think GAI could help balance the benefits of personalized financial advice with privacy protection?"

To explore the role of GAI specifically, additional questions addressed how participants perceived GAI's potential in providing tailored financial guidance while ensuring data security. For example, participants were asked: "Do you think GAI could offer personalized financial advice without compromising your privacy?" This question encouraged them to consider the innovative aspects of GAI, such as federated learning and synthetic data generation, and how these technologies could alleviate their privacy concerns. Thematic content analysis (Braun & Clarke, 2006) was used to analyze the interview data, identifying recurring themes and patterns that highlight the main concerns, preferences, and insights of Gen Z participants regarding AI in financial services.

Results. *The results of the interviews reveal significant insights into their attitudes towards AI-driven personalization in financial services, with a particular focus on the role of GAI in balancing the trade-off between personalization and privacy. The participants generally demonstrated a positive inclination towards AI, recognizing its potential to simplify and enhance financial decision-making. However, concerns regarding data privacy, especially in the context of financial services, remained relevant.*

A key finding from the interviews is that GAI could be particularly useful in addressing the initial fears of Gen Z individuals who have not yet ventured into investing. Many participants indicated that they felt uncertain or overwhelmed by the complexities of financial markets, with some admitting that they had avoided investing in the past due to lack of

knowledge and fear of making uninformed decisions. In this regard, GAI's ability to offer tailored investment recommendations using synthetic data and federated learning was seen as an important tool for easing their apprehensions. As one participant stated, "GAI could give me insights into the market without me feeling like I'm blindly trusting someone with my money," highlighting the importance of transparency and control in their financial decision-making.

Additionally, participants appreciated that GAI-powered systems could provide personalized advice without compromising their privacy. The use of such technology to generate insights while maintaining data confidentiality resonated with the participants, as they valued having a balance between personalized recommendations and privacy protection. For example, when asked about privacy concerns, one participant commented, "As long as my personal financial data is not being exposed to anyone, I'm more comfortable with AI helping me out." This sentiment was echoed by others, who expressed that their willingness to engage with AI-driven financial services would be significantly influenced by the transparency and security measures employed by the financial institutions.

Moreover, GAI's role in enhancing financial literacy was recognized as an essential benefit. Many participants admitted to having limited knowledge about investing and managing finances, often relying on family members or friends for advice. However, they noted that such guidance often lacked depth or professional expertise. Participants indicated that GAI could fill this gap by providing real-time, scenario-based simulations that help individuals understand financial principles, such as risk tolerance, diversification, and portfolio management. One participant explained, "Having a virtual financial advisor would help me understand how to balance risks and rewards. I would feel more confident making decisions on my own." This suggests that GAI's potential to educate and empower Gen Z investors could have a profound impact on their long-term financial independence.

The theme of trust also emerged as a significant factor in participants' acceptance of GAI in financial services. Despite their openness to AI-driven personalization, they emphasized the need for human involvement in finalizing decisions. Several participants expressed a preference for a hybrid model, where GAI provides initial recommendations and analysis, but human advisors play a crucial role in guiding the final decision-making process. As one participant put it, "I'd like the AI to help me get started, but I would still want a human to check over the big decisions." This reflects a broader sentiment that while GAI can enhance financial decision-making, it cannot fully replace the human element, particularly in situations that involve more complex financial choices.

When asked about the potential drawbacks of GAI, participants were primarily concerned with the possibility of over-reliance on AI and the loss of human judgment in financial decisions. One respondent noted, "If people start depending too much on AI, they might miss out on understanding the broader picture of the market." This concern highlights the importance of maintaining a balance between AI guidance and human insight, ensuring that AI is used as a tool to augment, rather than replace, critical thinking in financial decision-making.

Finally, an interesting perspective spontaneously emerged from the interviews regarding the type of bank that adopts AI, specifically distinguishing between traditional physical banks and digital banks. GZIs tend to prefer digital banks for everyday transactions, as they typically offer the same services as traditional banks at a lower cost due to their digital nature. However, when it comes to investments, rather than just savings or electronic payments, having a physical branch to visit in case of issues is considered essential. As a result, many respondents indicated that an optimal solution would be a hybrid model, where a traditional bank also incorporates a dedicated digital division functioning as a digital bank. Overall, although individuals in the United States are generally perceived as more risk-seeking compared to those in other countries, this cultural predisposition appears to be less pronounced when it comes to financial investments. The findings suggest that, despite a broader societal inclination toward risk-taking, American Gen Z investors exhibit a more cautious approach when managing their personal finances, demonstrating a heightened awareness of potential financial risks and uncertainties.

Research limitations. *While this study provides valuable insights into the role of GAI in addressing the personalization-privacy trade-off in financial services for GZIs, several limitations should be acknowledged. Firstly, the sample size of 10 American Gen Z participants, though purposefully selected, is relatively small and not necessarily representative of the entire cohort. Future research could expand the sample size to include a broader range of GZIs, considering factors such as socioeconomic background, educational level, and geographic location, to gain a more comprehensive understanding of their attitudes toward AI in financial services. Additionally, the study focused solely on American participants, limiting the cross-cultural applicability of the findings. Exploring how Gen Z in other countries, with different financial regulations and cultural attitudes toward privacy, perceives GAI in financial services would provide valuable comparative insights (Koo et al., 2021).*

Secondly, the research relied on qualitative interviews, which are inherently subjective and may be influenced by participants' personal biases or limited experience with AI-driven financial services. Future studies could incorporate quantitative methods, such as surveys or experiments, to validate and generalize the findings. Additionally, longitudinal studies could explore how Gen Z's attitudes toward AI in finance evolve over time, especially as they gain more experience with financial decision-making and AI technologies (Savin et al., 2024).

Finally, while this study focused on the potential of GAI to balance personalization and privacy, future research could investigate how other aspects of AI, such as explainability and transparency in decision-making, influence trust and engagement in financial services. Understanding the ethical implications and regulatory challenges associated with GAI

in financial services will also be crucial for developing effective policies that protect consumers while fostering innovation.

Managerial implications. *This study provides several key managerial implications for financial institutions looking to integrate GAI into their services, particularly when targeting Gen Z consumers. As this cohort becomes an increasingly important demographic in the financial sector, understanding their preferences and concerns is essential for creating personalized and privacy-conscious financial offerings. The findings highlight how GAI can be strategically leveraged to address the delicate balance between personalization and privacy, allowing financial firms to create more customer-centric services (Yadav & Tandon, 2024; Singh et al., 2024).*

Firstly, financial institutions can use GAI to offer tailored investment recommendations while mitigating privacy concerns, a key consideration for Gen Z consumers. With increasing fears around data breaches and misuse, GAI's ability to generate synthetic data and utilize federated learning techniques provides a way to offer personalized financial advice without directly accessing sensitive customer data. This not only ensures compliance with data privacy regulations but also helps in building trust with clients. Financial managers should prioritize implementing these privacy-preserving technologies into their AI systems to alleviate consumer anxieties and create a more secure financial advisory environment (Wang et al., 2024).

Additionally, the study underscores that Gen Z consumers, while comfortable with AI-driven services, do not see AI as a full replacement for human advisors. They value AI for its ability to provide initial analysis and insights, but prefer a hybrid model where human advisors offer personalized guidance and reassurance (Huang & You, 2023). This suggests the importance of adopting a hybrid advisory model that combines AI-driven recommendations with human expertise, shedding light on a research domain that is worthy of further investigations. Financial institutions should focus on training their human advisors to collaborate with AI systems, ensuring they can interpret AI insights and provide human-centered advice. This model would allow firms to offer the best of both worlds, i.e., efficiency, scale, and personalization through AI, alongside trust and emotional reassurance through human advisors. This approach will likely resonate better with GZIs, who value both technological innovation and human connection (Windasari et al., 2022).

The study also emphasizes the role of GAI in enhancing financial literacy, particularly among first-time investors (Garg & Singh, 2018). For many GZIs, investing can be an intimidating and complex experience. Financial institutions can capitalize on this by offering GAI-powered educational tools, interactive simulations, and scenario-based learning experiences that help clients understand key financial concepts. This approach could help GZIs feel more confident in their investment decisions, reduce the fear associated with complex financial markets, and ultimately foster a sense of financial empowerment. Providing these educational resources could also improve customer engagement and long-term loyalty, positioning financial institutions as trusted partners in customers' financial journeys (Desai et al., 2024).

Furthermore, firms must prioritize transparency in their AI-driven systems. Clear communication about how GAI operates, how it ensures data privacy, and how it complies with relevant regulations is essential for maintaining consumer trust. Gen Z is more likely to engage with services that offer transparency about data usage and decision-making processes. Financial institutions should provide detailed explanations of how AI models are used, the safeguards in place to protect user data, and how they align with privacy regulations. This transparency will reassure Gen Z clients, who are often wary of the potential misuse of their data and strengthen their relationship with the institution (Amarna et al., 2025).

Finally, an important consideration for financial institutions pertains to the distinction between digital banks and traditional physical banks in the integration of AI-driven services. Specifically, financial institutions should account for the growing preference for a hybrid banking model when designing AI-driven financial services, ensuring both the accessibility of digital banking and the security provided by physical branches for investment-related services (Rangaswamy et al., 2021).

Originality of the paper. *This paper presents a novel contribution to the field of financial technology by exploring the role of GAI in moderating the personalization-privacy trade-off in financial services, specifically in relation to GZIs. While there is considerable research on AI and personalization in financial services, this study is one of the first to focus on GAI's potential to simultaneously offer personalized financial advice while addressing privacy concerns, that is an issue that has become increasingly relevant in light of growing data privacy anxieties (Agu et al., 2024).*

The originality of the paper lies also in its focus on a specific cohort, i.e., GZIs, who, as digital natives, are uniquely positioned to interact with AI-driven services. Unlike previous studies that predominantly examine older generations, this paper examines the attitudes of Gen Z towards AI-driven financial decision-making, providing insights into how GAI can serve as a bridge between the desire for personalized services and the need for data privacy. The study highlights that Gen Z, while generally open to sharing data for personalization, remains cautious about privacy risks, making it essential for financial institutions to find ways to preserve privacy while offering tailored services (Srivastava et al., 2024).

Furthermore, the paper contributes to the emerging field of GAI by showcasing its potential in the context of financial advising. By utilizing innovative techniques such as federated learning and synthetic data generation, GAI can provide personalized insights without compromising user privacy. This application of GAI in financial services is still underexplored, and this research fills an important gap by offering an in-depth exploration of how GAI can be employed to balance the personalization-privacy dichotomy for those that will be the "spenders of tomorrow" (Long et al., 2020; Chatterjee et al., 2023).

Finally, this study offers a fresh perspective on risk-seeking behavior among Gen Z investors, particularly in the U.S., where individuals are traditionally perceived as more inclined toward financial risk-taking compared to other cultural contexts, such as Italy. However, findings suggest that this risk-seeking tendency is less pronounced when it comes to

personal investments, as GZIs exhibit a more cautious approach in financial decision-making. By examining how GAI can help mitigate investment hesitations and enhance financial literacy, this research sheds light on an emerging dynamic where technology plays a critical role in shaping risk perceptions and investment behaviors among younger generations (Oyewole et al., 2024).

Key words: *Generative AI; financial services; Generation Z; Personalization-Privacy Trade-off; Data privacy; AI-driven Financial Decision-making*

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Unveiling the Dark Side of Technological Innovation: Navigating the Sustainability Challenges of Generative Artificial Intelligence - A Preliminary Exploration

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Abstract

This study explores the "dark side" of technological innovation, focusing on the sustainability challenges associated with Generative Artificial Intelligence (GAI) and its implications for business and management. While technological innovation brings significant advancements, it also entails negative environmental, social, and economic impacts, such as ecological degradation and social inequalities. Rather than directly measuring these impacts, the study investigates how Generation Z-digital natives with strong environmental and social values-perceives and reconciles the tension between the benefits of GAI and its potential negative consequences. Employing a qualitative approach through interviews with university students, the research reveals growing concerns around AI's environmental footprint, its role in widening social gaps, and the erosion of human connection. These perceptions highlight the need for a more responsible and sustainable implementation of emerging technologies. By centering the voices of Generation Z, the study offers novel insights into how future users and professionals interpret and navigate the ethical and ecological trade-offs of innovation.

Framing of the research. *The "dark side" of innovation (Coad et al., 2022; Cheng et al., 2022), while often overshadowed by the enthusiasm surrounding technological progress, warrants critical examination due to its potential unsustainable effects. Innovation, by its very nature, serves as a powerful catalyst for social and economic advancement; however, its consequences are not always beneficial. It is imperative to acknowledge the duality of innovation-while it can bring about significant improvements in quality of life and productivity, it also presents challenges such as environmental degradation, social inequalities, and economic disruption. The notion of the "dark side" of innovation encapsulates these paradoxical outcomes, emphasizing the need for a more nuanced understanding of its impact (Gossart, 2015).*

At the core of this discussion lies the concept of sustainability, which involves the long-term balance between technological advancement and ecological, social, and economic well-being (Røpke, 2012; Moreau et al., 2021). The unsustainable aspects of technological innovation manifest through various mechanisms, particularly in the form of environmental damage, resource depletion, and the exacerbation of existing societal disparities. This phenomenon is particularly pronounced in industries driven by rapid technological advancements, where growth often occurs without sufficient consideration for the finite nature of resources and the social consequences of such progress.

One of the primary manifestations of the unsustainable nature of technological innovation is the environmental cost associated with new technologies (Ceballos et al., 2017; Lenton et al. 2019; Díaz et al., 2019; Freitag et al., 2021). As innovations proliferate, the demand for raw materials increases, leading to the depletion of non-renewable resources. Additionally, the rise in electronic waste, particularly within the digital and tech sectors, contributes to an escalating environmental crisis. The growing reliance on digital infrastructures, from cloud computing to Artificial Intelligence (AI), further compounds the issue, as these technologies necessitate vast amounts of energy and produce substantial carbon footprints (Andrae & Edler, 2015; Belkhir & Elmeligi, 2018).

Simultaneously, the social ramifications of technological innovation, particularly in terms of inequality and access, must not be overlooked (Witt, 1996). While new technologies may improve certain aspects of life, they often disproportionately benefit those already positioned within socio-economic power structures. Conversely, marginalized populations may face exclusion from the opportunities offered by technological progress, deepening existing divides.

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Among the most pressing contemporary examples of the intersection between innovation and sustainability is Generative Artificial Intelligence (GAI). GAI represents a distinct subset within the broader category of AI, characterized by its capacity to autonomously generate novel content-such as text, images, audio, and code-by identifying and replicating patterns from vast pre-existing datasets (Wessel et al., 2023; Lim et al., 2023). Unlike more traditional forms of AI, which primarily perform analytical or predictive tasks within fixed parameters, GAI is inherently creative and simulates human-like outputs, making it particularly relevant to fields where intuition, originality, and expression are central.

This unique creative potential, however, comes with significant sustainability concerns (Mikalef et al., 2022; Cheng et al., 2022; Barari et al., 2024).

The development and deployment of GAI require extensive computational power, translating into high energy consumption and a substantial carbon footprint. The environmental impact of GAI is not limited to infrastructure but extends to the training processes themselves, which often involve energy-intensive optimization over massive datasets.

Furthermore, GAI's ability to replicate tasks once performed by humans-particularly in knowledge-based and creative sectors-raises specific concerns about labor market disruption and job displacement. While these issues are not exclusive to GAI, its scale, speed, and scope amplify such effects, distinguishing it from other forms of AI and justifying a focused analysis. Understanding GAI's specific sustainability implications is therefore critical for developing informed, responsible innovation strategies.

Purpose of the paper. *In light of the challenges associated with the "dark side" of innovation, it is crucial to critically examine the potential negative implications that often accompany technological advancements. It is essential to consider the sustainability of innovation, especially in the context of emerging technologies like GAI (Wach et al., 2023; Kim, 2023). The rapid pace of technological change necessitates a reevaluation of traditional paradigms of innovation, where the focus has often been on the uncritical celebration of progress. Instead, a more balanced perspective is required-one that not only acknowledges the potential benefits of innovation but also critically engages with its ecological, social, and economic costs. This necessitates the development of more robust regulatory frameworks able to ensure the responsible deployment of innovative technologies, alongside the promotion of practices that prioritize environmental conservation, social equity, and economic stability.*

Ultimately, fostering sustainable innovation requires a multifaceted approach that integrates ethical considerations, environmental stewardship, and social responsibility into the design, development, and deployment of new technologies. As such, the focus should shift from mere technological advancement to a more holistic understanding of innovation-one that seeks to harmonize progress with the broader goals of sustainability and human flourishing. In the case of GAI, this holistic approach becomes even more critical, as its rapid growth demands a conscientious effort to balance technological progress with the broader goals of ecological preservation, social equity, and ethical responsibility.

This aspect will be explored as a preliminary study focusing on Generation Z, given their unique position as digital natives and their increasing reliance on technology in daily life (Turner, 2015; Dangmei & Singh, 2016; Rossi et al., 2023; Fulco & Aquilani, 2023). The growing prevalence of AI in both personal and professional spheres makes it crucial to examine how this demographic engages with AI and its potential biases. Generation Z, while deeply integrated with digital technologies, has been found to exhibit heightened awareness of social issues, including fairness and equality (MacGregor Pelikánová & MacGregor, 2020). Moreover, GAI represents a particularly relevant area of interest for this generation, as technologies, such as ChatGPT, are already embedded in their daily experiences, influencing their behaviors, decisions, and perceptions. Given the increasing energy demands of AI technologies, particularly those relying on vast computing power for model training and deployment, this study aims to explore how Generation Z reconciles their environmental values with their use and acceptance of AI-driven systems. The potential tension between embracing AI for its benefits and acknowledging its environmental cost presents an important area of investigation.

Methodology. *A qualitative, inductive, and exploratory approach was chosen as it enables a deeper understanding of participants' perspectives and reduces researcher bias (Armstrong, 1979). This method encourages the emergence of unexpected insights, allowing data to unfold organically rather than imposing pre-existing hypotheses. Given the novelty of the research topic and the lack of prior studies, an interpretative approach was considered essential for gaining a comprehensive understanding of the phenomenon.*

To facilitate this exploration, semi-structured in-depth interviews were employed, providing a flexible and open-ended dialogue between the interviewer and participants (Schreier, 2012). The interviews focused on exploring the (un)sustainability of GAI. This approach is particularly effective for exploring new and complex issues in depth, especially with young respondents who are familiar with the subject matter (Boyce & Neale, 2006). Thematic content analysis (Braun & Clarke, 2006) was used to analyze the interview data, allowing for a nuanced identification of recurring themes and patterns that emerged from the participants' responses. Thematic analysis was chosen for its flexibility and its capacity to provide rich, in-depth insights into complex phenomena, particularly when exploring subjective experiences and perceptions. This method allowed the researchers to identify key themes related to the sustainability of GAI, drawing attention to underlying concerns and perceptions within the data.

Purposive sampling was employed to select participants who could provide valuable insights into the topic (Carson et al., 2001). The study was conducted in Rome, Italy, and participants were selected from a local university. The final sample included 10 participants, all Italian students, equally divided between genders (5 males and 5 females). This composition ensured gender balance and prior experience with AI, focusing specifically on Italian respondents to explore their perceptions and experiences with AI in depth.

During the interview, participants initially engaged in a discussion focused on recalling and critically examining the key concepts under investigation, alongside an exploration of the research context. Subsequently, they shared their personal experiences with technology and AI, with particular attention to how they perceive the (un)sustainability of AI-driven systems. An example question was: "How do you feel about the environmental impact of AI? Do you think the benefits of AI outweigh its potential ecological costs?". To further explore the social aspects of sustainability, additional questions were included to understand participants' views on how AI adoption affects social structures, relationships, and communities. These questions aimed to provoke thought on the broader societal implications of AI and its potential to either foster or disrupt social well-being. For example, participants were asked: "Do you believe AI could enhance or undermine social cohesion? How might it affect societal values, such as empathy and trust?". Additionally, the interview addressed the economic dimension of sustainability, seeking to understand how participants view the economic implications of AI on industries and job markets. These questions encouraged reflection on both the opportunities and challenges that AI presents from an economic perspective. For example, participants were asked: "What are your thoughts on the economic implications of AI? Do you think AI can help create new economic opportunities, or do you see it as a potential threat to existing jobs?" or "How do you think AI-driven automation will affect job markets? Are there specific sectors that you think will benefit or suffer from AI adoption?".

Results. *The results presented in the paper offer a comprehensive and nuanced analysis of the complex relationship between environmental sustainability and technological innovation, particularly in the context of AI. Respondents universally recognized the importance of environmental sustainability but acknowledged that its complexity-especially when coupled with the energy-intensive nature of AI-makes it difficult to fully grasp and integrate into everyday thinking. While respondents were aware of the environmental implications of AI technologies, particularly regarding energy consumption, many noted that these concerns remained abstract and were rarely considered in the routine use of AI tools. In this regard, AI has become so deeply embedded in daily life that its environmental costs often go unnoticed, operating almost invisibly without prompting reflection on its broader impact.*

Nonetheless, respondents did voice concerns regarding the environmental sustainability of AI, particularly in contexts where its energy consumption might outweigh the benefits. A critical paradox emerged: while AI may provide significant efficiencies and convenience, its environmental cost-especially in energy-intensive applications-could undermine its overall value. One respondent raised a pertinent question: "If AI replaces people but still consumes a lot of energy, what's the real benefit?" This remark highlights the tension between technological advancement and the need to address environmental sustainability. The acknowledgment of AI's potential to enhance productivity is tempered by the recognition that its widespread use could contribute to unsustainable energy consumption, raising questions about its long-term viability and societal impact.

Another important theme emerging from the responses is the tension between technological advancement and the traditional values embedded in certain sectors. Respondents expressed discomfort with the over-reliance on technology in contexts where human connection and empathy are central to the experience. Many observed that certain services and industries are deeply rooted in human interaction, and the use of AI might undermine these values. As one participant remarked, "People expect a certain level of tradition and personal service. Too much technology makes the experience feel cold and impersonal." This sentiment points to the fear that excessive technological integration could dilute the human elements that are integral to positive service experiences, whether in customer service, healthcare, or other traditionally human-centered sectors.

This concern about the loss of human connection extends to broader debates about labor disruption caused by automation. Many respondents expressed unease about the displacement of human workers by AI-driven automation. While some level of AI assistance was welcomed-such as using AI for streamlining tasks like making recommendations or assisting with simple inquiries-respondents emphasized that human interaction remained indispensable, especially for roles requiring empathy, intuition, and personalized engagement. One respondent noted, "I don't mind AI helping with recommendations, but if there's no one to speak to when I need help, that's a problem." This highlights a fundamental concern about the potential over-reliance on AI in settings where human labor and interaction are essential to success. The introduction of AI could therefore disrupt not only labor markets but also societal values regarding the importance of human agency in service-based interactions.

In conclusion, while AI presents significant opportunities for efficiency and innovation, the respondents' concerns about its environmental sustainability and its potential to disrupt labor markets reveal the complex challenges surrounding its integration into various sectors. The widespread recognition of the environmental costs associated with energy-intensive AI technologies, coupled with concerns about the erosion of human interaction, suggests that the implementation of AI must be approached with careful consideration of both environmental and social consequences. As AI continues to be integrated into diverse sectors, it will be critical to strike a balance between technological progress and a commitment to sustainability, human engagement, and the preservation of the essential values that define human-centered industries. Table 1 summarizes how each aspect of sustainability plays a critical role in the ongoing discussion about AI's impact and its integration into various sectors, particularly in relation to its environmental, social, and economic implications, with these findings specifically reflecting the perspectives of Generation Z.

Table 1: Sustainability aspects in the context of AI integration: perspectives from Generation Z

Aspect of sustainability	***Key insights***	***Challenges/Concerns***
Environmental sustainability	*- Respondents acknowledge the environmental importance of sustainability.* *- Energy consumption of AI is a major concern.* *- Many are unaware of the environmental costs in daily AI use.*	*- Energy-intensive nature of AI could undermine its environmental benefits.* *- AI's environmental costs often go unnoticed due to its deep integration into daily life.*
Social sustainability (human interaction)	*- Many view human connection and empathy as central to services.* *- Over-reliance on AI in industries rooted in human interaction may devalue personal service.*	*- Excessive AI could make services feel impersonal, undermining traditional human elements of customer service.* *- AI's impact on human connection and the warmth in services is a concern.*
Economic sustainability (labor disruption)	*- Some AI assistance (e.g., recommendations) is welcomed.* *- Respondents emphasize the need for human interaction in roles requiring empathy and intuition.*	*- Automation may displace human workers.* *- AI could disrupt labor markets and societal values related to human labor.*

Source: Authors' elaboration

Research limitations. *The study has several limitations. First, it overlooked country-specific differences, thereby neglecting the variations in AI adoption and its perceived impact across diverse national contexts. The study focused solely on an Italian sample, and while the findings provide valuable insights into the Italian perspective, they may not be universally applicable or representative of other countries. Previous research (Koo et al., 2021) suggests that attitudes toward AI can differ significantly between nations, influenced by factors such as technological infrastructure, governmental regulations, and cultural attitudes toward innovation. Therefore, future research could benefit from including participants from multiple countries to better understand how national contexts shape perceptions of AI and its environmental, social, and economic implications.*

Second, the study did not consider industry-specific differences in AI adoption (Hoffmann & Mehler, 2023), which may be particularly relevant when assessing its environmental, social, and economic impacts. Different sectors, such as healthcare, finance, and manufacturing, may have distinct requirements, challenges, and opportunities related to AI implementation, which could significantly affect how sustainability issues are perceived and addressed. For example, the environmental cost of AI in energy-intensive industries like manufacturing might differ markedly from its use in service-oriented sectors. It is also important to recognize that not all industries are equally 'human-centered'. Sectors like healthcare, education, and customer service are heavily reliant on direct human interaction, while others, such as manufacturing or business automation, place less emphasis on such contact. By not exploring these industry-specific nuances, the study's findings may overlook important contextual factors that influence the integration of AI and its sustainability implications across different sectors. Future research could enrich the understanding of AI's sustainability by investigating these sector-specific variations.

Third, the study was limited to Generation Z respondents, and it would be interesting to explore how different generational cohorts-such as Millennials, Generation X, and Baby Boomers-perceive the environmental, social, and economic implications of AI. As each generation has distinct experiences, values, and levels of technological adoption, their perspectives on AI might differ significantly (Savin et al., 2024). Exploring these generational differences could provide a more comprehensive view of the impact of AI and highlight how various age groups envision its role in shaping the future. Understanding these generational dynamics could offer valuable insights into how AI is perceived and integrated across different segments of society.

Finally, the current sample consists solely of university students, which raises questions about its representativeness. While this is not a critical flaw, future research could consider expanding the sample to include both students and non-students from different educational backgrounds and regions. This would provide a broader perspective on how various groups within Generation Z perceive the environmental, social, and economic implications of GAI. Moreover, a clearer understanding of how Gen Z's concerns about the negative impacts of GAI, which remain abstract in their daily use of AI tools, may begin to influence their consumption choices could offer additional insights into their decision-making processes. Furthermore, integrating complementary quantitative analyses alongside the qualitative interviews could enhance the robustness of the study's findings. A mixed-methods approach would allow for a deeper exploration of broader patterns in perceptions of GAI, thereby offering a more comprehensive understanding of its societal implications and strengthening the validity of the conclusions drawn from the qualitative data.

Managerial implications. *The findings of this study offer valuable managerial insights, especially for businesses integrating AI into their operations (Loureiro et al., 2021; Hussain, 2023). One key takeaway is the need for companies to strike a balance between leveraging the advancements offered by AI and addressing growing concerns about its environmental sustainability. While AI provides significant efficiencies and convenience, its energy-intensive nature raises valid concerns regarding its long-term environmental impact. Managers should be aware of these environmental costs, especially in energy-consuming AI applications, and take proactive measures to mitigate them. This might include adopting more energy-efficient AI technologies, exploring methods to offset the carbon footprint of AI systems, or implementing sustainable practices in their adoption. Furthermore, transparent communication about the environmental*

efforts businesses are undertaking could help build consumer trust, particularly as more and more consumers, especially Generation Z, are becoming increasingly aware of the ecological consequences of AI.

Another critical consideration emerging from the findings is the tension between technological progress and core human-centered values. Respondents expressed concerns about the erosion of empathy and personal connection in services increasingly mediated by AI. Managers should therefore adopt hybrid models, where AI handles routine and data-driven tasks, while human agents continue to provide emotional intelligence, intuition, and personalized care. In healthcare, for example, AI can assist with administrative tasks and data management, but human providers should remain central to patient care, which relies on empathy and trust. Similarly, in education, while AI can support personalized learning, teachers should continue to foster student development through emotional intelligence and mentorship. In customer service, AI can handle routine inquiries, but human agents should still be available to address more complex issues that require empathy. This augmentation strategy (Raisch & Krakowski, 2021)-based on collaboration between humans and machines-helps maintain the human touch, ensuring that technology enhances rather than replaces human capabilities.

The study also highlights fears of labor market disruption, particularly in roles requiring emotional engagement. Rather than replacing jobs, businesses should invest in reskilling and upskilling employees to adapt to new roles emerging alongside AI. Encouraging the coexistence of human labor and AI not only mitigates workforce displacement but also strengthens service quality and operational efficiency.

Additionally, the study underscores the importance of understanding generational perspectives, especially in the context of Generation Z. As the generation most vocal about environmental and social issues, Generation Z's concerns about the environmental and social impacts of AI should not be overlooked. Managers must take these concerns into account when developing and marketing AI-based products and services. This generation places a high value on sustainability, so businesses that can demonstrate their commitment to eco-friendly AI solutions will likely appeal to this growing consumer base. Aligning AI strategies with the values and expectations of this cohort will help ensure that AI adoption is perceived as both a technological and socially responsible advancement.

Originality of the paper. *This research holds significant relevance in the context of understanding the evolving relationship between Generation Z and AI. As this generation becomes increasingly integrated into the digital ecosystem, their interactions with AI, particularly in recognizing environmental, social, and economic impacts, could play a pivotal role in shaping their consumer behaviors, trust in AI, and broader acceptance of AI-driven services. Generation Z's heightened awareness of sustainability issues positions them as a unique demographic whose perspectives on the ethical implications of AI must be carefully considered. Their ability to identify, challenge, or overlook biases embedded within AI, alongside their understanding of the costs associated with AI technologies, will inevitably influence their perceptions of these systems' fairness, reliability, and sustainability.*

Moreover, understanding how Generation Z navigates these concerns is not only crucial for adapting AI systems to align with their values, but it also provides an essential framework for the future development of AI technologies. By examining how this generation either embraces or challenges the ethical and environmental implications of AI, we can identify the key factors that influence their trust in AI and their willingness to adopt AI-driven services. This research, therefore, becomes a crucial avenue for exploring how AI systems can be designed and implemented in ways that foster ethical considerations, reduce biases, and mitigate environmental harm.

In addition, this inquiry is timely as it can offer profound insights into how innovation can be balanced with broader societal goals of equity and sustainability. By examining how Generation Z evaluates the social and ecological ramifications of AI, we can better understand the ways in which these concerns may shape future consumer behavior. This, in turn, will be pivotal for ensuring that technological advancements in AI do not perpetuate social inequalities or contribute to environmental harm.

Keywords: *Technological Innovation; Generative Artificial Intelligence; Sustainability; Generation Z*

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Strategic Innovation in the Digital Age: Integrating Growth Hacking, Dynamic Capabilities, and Artificial Intelligence

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Abstract

In an environment of rapid technological change and increasing global competitiveness, organizations are constantly seeking innovative approaches to sustain competitive advantage and stimulate growth. This article explores the intersection of growth hacking (GH), dynamic capabilities (DCs) and artificial intelligence (AI), proposing a conceptual framework for strategic innovation management. Through a critical review of the literature, the study examines how the data-driven approach of GH can enhance the development of DCs, facilitating organizational adaptation and continuous innovation. The introduction of AI in this context emerges as a key catalyst, accelerating the identification of market opportunities and optimizing strategic decision-making processes. The findings highlight how the integration of these elements can provide organizations with a sustainable competitive advantage in the digital economy, offering significant implications for both academic research and management practice.

Framing of the Research. *The concept of dynamic capabilities (DCs) emerged as an extension of the resource-based view (RBV) of the firm, which posits that organizations gain competitive advantage through their unique resources and capabilities (Barney, 1991). While the RBV provides valuable insights into why firms differ in performance at a specific point in time, it has been criticized for its static nature, particularly in rapidly changing environments (Eisenhardt and Martin, 2000). To address this limitation, Teece et al. (1997) introduced the DCs framework, defining these capabilities as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Subsequent research has refined and expanded this concept. Winter (2003) distinguished between operational capabilities (zero-order) and DCs (higher-order), highlighting that the latter involve change-oriented capabilities that help firms reconfigure their resource base. Teece (2007) further delineated three fundamental processes underlying DCs: sensing (identifying opportunities and threats), seizing (mobilizing resources to address opportunities), and transforming (continuous renewal of assets and organizational structures). More recent theoretical developments have explored the microfoundations of DCs (Teece, 2007; Felin et al., 2012; Scuotto et al., 2022), their relationship with organizational learning (Zollo and Winter, 2002), and their role in digital transformation (Warner and Wäger, 2019). Despite these advances, criticism persists regarding the vagueness and tautological nature of the concept (Arend and Bromiley, 2009), as well as the limited empirical research on how DCs are actually developed and deployed in organizations (Capurro et al., 2022).*

The current economic landscape is characterized by increasingly shorter innovation cycles and intensifying global competition (Teece, 2018). In this context, organizations are seeking innovative approaches to sustain competitive advantage and stimulate growth. Growth Hacking (GH) emerged in the startup ecosystem as a methodology focused on rapid growth through data-driven experimentation (Ellis and Brown, 2017). Originally coined by Sean Ellis in 2010, the term referred to finding scalable, resource-efficient methods to acquire and retain users. While initially associated with digital marketing tactics, GH has evolved into a broader strategic approach encompassing product development, user experience, and data analytics. The academic literature on GH remains relatively nascent. Herttua et al. (2016) conducted one of the first scholarly examinations of the concept, defining it as a process of rapid experimentation across marketing channels and product development to identify the most efficient ways to grow a business. Subsequent work by Bohnsack and Liesner (2019) positioned GH within the broader context of digital entrepreneurship, highlighting its role in accelerating market validation and resource acquisition. A distinctive characteristic of GH is its emphasis on the "build-measure-learn" cycle (Ries, 2011), which enables rapid iteration based on real-time data. This approach facilitates the development of what Blank (2013) terms "customer development", a process of understanding customer needs through continuous experimentation and feedback. The GH methodology also emphasizes cross-functional collaboration, breaking down traditional silos between marketing, product development, and data analysis (Ellis and

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Brown, 2017). Despite its practical impact, GH remains undertheorized within management literature. Existing research has primarily focused on documenting tactics and case studies (Troisi et al., 2020), with limited attention to how these approaches relate to established theories of strategic management and organizational capabilities.

Despite the growing importance of DCs and GH fields, their intersection remains relatively unexplored in the academic literature. GH, with its data-driven approach and emphasis on rapid experimentation, potentially offers practical mechanisms for developing and applying DCs. This connection becomes even more relevant with the advent of AI, which is radically transforming the ways in which organizations acquire, process, and use information for strategic decision making (Agrawal et al., 2018). These advancements not only enhance the capabilities of GH-by enabling more precise customer segmentation, automated experimentation, and personalized marketing-but also strengthen the sensing and reconfiguration dimensions of DCs. AI allows firms to identify weak signals in the market, optimize decision-making in real time, and automate resource reallocation, thereby bridging the gap between short-term growth-oriented strategies and long-term strategic agility.

Existing research on DCs has focused primarily on theoretical and conceptual aspects (Capurro et al., 2022), with limited attention to the practical mechanisms through which these capabilities are developed and implemented in organizations. On the other hand, the literature on GH remains predominantly practice-oriented, with few attempts to frame these techniques in broader theoretical frameworks (Herttua et al., 2016).

This gap in the literature presents a significant opportunity to explore how experimental and data-driven approaches to GH can inform the development of DCs. Moreover, the integration of AI in this context offers new insights into how emerging technologies can enhance both GH and DCs by facilitating faster, data-driven decision making.

The integration of these three elements-GH, DCs, and AI-represents a promising area of research with potential significant implications for both theory and management practice. This study aims to fill this gap by exploring how organizations can leverage the intersection of these fields to effectively navigate complex and rapidly changing business environments.

Purpose of the Paper. *The primary objective of this research is to develop an integrated framework that connects GH, DCs, and AI to advance strategic innovation management. By systematically examining the interplay between these three dimensions, the study aims to provide both theoretical clarity and practical insights into how organizations can leverage their intersection to enhance agility, foster innovation, and drive sustained growth.*

This research first seeks to conceptually analyze the intersection of GH and DCs, identifying the mechanisms through which GH's data-driven approach enhances DCs development. GH is rooted in an agile, iterative mindset that prioritizes fast learning cycles, continuous optimization, and data-driven decision-making. However, while it has been widely adopted in practice, its theoretical implications remain underdeveloped. By linking GH to DCs, this study investigates how experimentation, customer-centricity, and real-time analytics contribute to the development of adaptive capabilities within organizations. Understanding these mechanisms provides valuable insights into how businesses can create and sustain dynamic capabilities in fast-evolving digital landscapes.

The study then examines the role of AI as a catalyst for the integration of GH and DCs. AI is revolutionizing business operations by automating decision-making, enhancing pattern recognition, and enabling predictive analytics (Iansiti and Lakhani, 2020). We explore how AI-driven technologies can augment the effectiveness of both GH and DCs, enabling firms to sense emerging opportunities more efficiently, optimize resource allocation, and accelerate strategic transformations. The research also considers potential challenges, such as the risks of algorithmic bias, ethical concerns, and the need for organizations to develop AI governance frameworks.

Additionally, the research identifies the organizational and contextual conditions that influence the implementation of an integrated GH-DCs-AI approach. While the integration of these elements holds great potential, its success is contingent on various organizational and industry-specific factors. These may include corporate culture, leadership commitment, governance structures, technological infrastructure, and market conditions. This study outlines the key enablers and barriers that shape the adoption and effectiveness of a GH-DCs-AI framework, offering a nuanced understanding of when and how firms can best implement such an approach.

Finally, the study derives actionable managerial implications for firms seeking to implement data-driven approaches to strategic innovation. The research bridges the gap between theory and practice, providing concrete recommendations for business leaders looking to enhance their agility, experimentation capabilities, and AI-driven decision-making processes. By translating research insights into practical frameworks, this study offers guidelines on how organizations can build scalable, resilient, and innovation-oriented business models in an era of rapid technological change.

By pursuing these interconnected objectives, this study aspires to contribute both to the academic discourse on DCs, GH, and AI-driven strategy and to managerial practice in the digital economy. As organizations increasingly operate in highly volatile, technology-driven markets, understanding how they can combine growth-oriented experimentation, DCs, and AI-driven decision intelligence will be essential for long-term success. This research, therefore, offers a comprehensive perspective on how firms can build and sustain competitive advantage by strategically integrating GH, DCs, and AI into their core business practices.

Methodology. *This study adopts a conceptual research methodological approach, based on a critical review of existing literature and the development of a conceptual framework. The choice of a conceptual research methodology is motivated by the exploratory nature of the research, which aims to synthesize and integrate existing knowledge to develop new theoretical perspectives on the intersection of GH, DCs, and AI.*

The first phase of the methodology involves a systematic literature review on the three main theoretical constructs: GH, DCs, and applications of AI in strategic management. The review uses major academic databases (Web of Science, Scopus, EBSCO) and follows a structured process of searching, selecting and analyzing relevant contributions. Inclusion criteria include peer-reviewed articles, scholarly books and, given the emerging nature of some topics, also high-quality white papers from recognized sources. The literature review focuses on identifying key concepts, theoretical relationships, and gaps in existing knowledge, with a focus on mechanisms through which GH and AI can enhance the development of DCs.

The second phase of the methodology involves the development of a conceptual framework that integrates the three theoretical constructs. This framework is constructed through an iterative process of synthesis and abstraction, based on critical analysis of the literature. The goal is to propose a theoretical model that explains how the experimental and data-driven approach of GH, enhanced by AI, can facilitate the development and application of DCs in organizations. The model is evaluated in terms of its internal consistency, explanatory capacity, and relevance to management practice.

Unlike an empirical study based on case studies or quantitative analysis, this conceptual approach focuses on generating new theoretical insights through the synthesis and integration of existing knowledge. This approach is particularly suitable for exploring intersections between emerging research fields and for developing theoretical models that can guide future empirical research.

Results. *AI has emerged as a transformative force in strategic management, fundamentally altering how organizations process information, make decisions, and allocate resources (Agrawal et al., 2018). AI encompasses a range of technologies, including machine learning, natural language processing, and computer vision, which enable systems to perform tasks that traditionally required human intelligence. In the context of strategic decision-making, AI offers several distinct advantages. First, it enhances organizations' ability to process and analyze vast amounts of structured and unstructured data, identifying patterns that might otherwise remain undetected (Vlačić et al., 2021). Second, AI facilitates real-time decision-making, enabling organizations to respond more rapidly to emerging opportunities and threats (Iansiti and Lakhani, 2020). Third, AI can augment human capabilities by automating routine tasks and providing decision support, allowing managers to focus on higher-level strategic thinking (Akter et al., 2023).*

The literature on AI and strategic management has primarily focused on how these technologies can enhance operational efficiency and decision quality. Agrawal et al. (2018) argue that AI fundamentally reduces the cost of prediction, making it increasingly feasible to automate decision processes that involve forecasting. Iansiti and Lakhani (2020) extend this perspective, suggesting that AI enables the creation of "digital operating architectures" that can fundamentally transform competitive dynamics within industries. More recent research has begun to explore the organizational implications of AI adoption. Benbya et al. (2020) highlight the need for complementary human capabilities and organizational structures to effectively leverage AI technologies. Similarly, Raisch and Krakowski (2021) examine the tensions that arise as organizations navigate the integration of human and AI in decision-making processes. The literature review revealed significant patterns in the intersection of GH, DCs, and AI, leading to the development of an integrated conceptual framework for strategic innovation management. The findings are organized around four main themes that emerged from the analysis.

First, the analysis revealed specific mechanisms through which the data-driven approach of GH reinforces the development of DCs. In particular, the "build-measure-learn" cycle characteristic of GH emerged as a powerful tool for accelerating the processes of detection, capture, and reconfiguration identified by Teece (2007) as key components of DCs. The GH approach, with its emphasis on continuous experimentation and rapid learning, enables organizations to sharpen their ability to "sense", that is, to perceive environmental changes in a timely manner; to "seize", that is, to readily grasp emerging opportunities; and to "reconfigure", that is, to effectively reconfigure their resources. This relationship is particularly evident in case studies of technology startups, where data-driven cross-functional teams have demonstrated remarkable adaptability and innovation.

Second, AI has emerged as a powerful catalyst in the integration of GH and DCs. AI technologies, particularly machine learning and natural language processing algorithms, significantly improve the detection capabilities of organizations, enabling the identification of patterns and trends that would be difficult to detect with traditional methods. In addition, AI-based decision-making systems accelerate decision-making processes, enabling faster and more personalized responses to market opportunities.

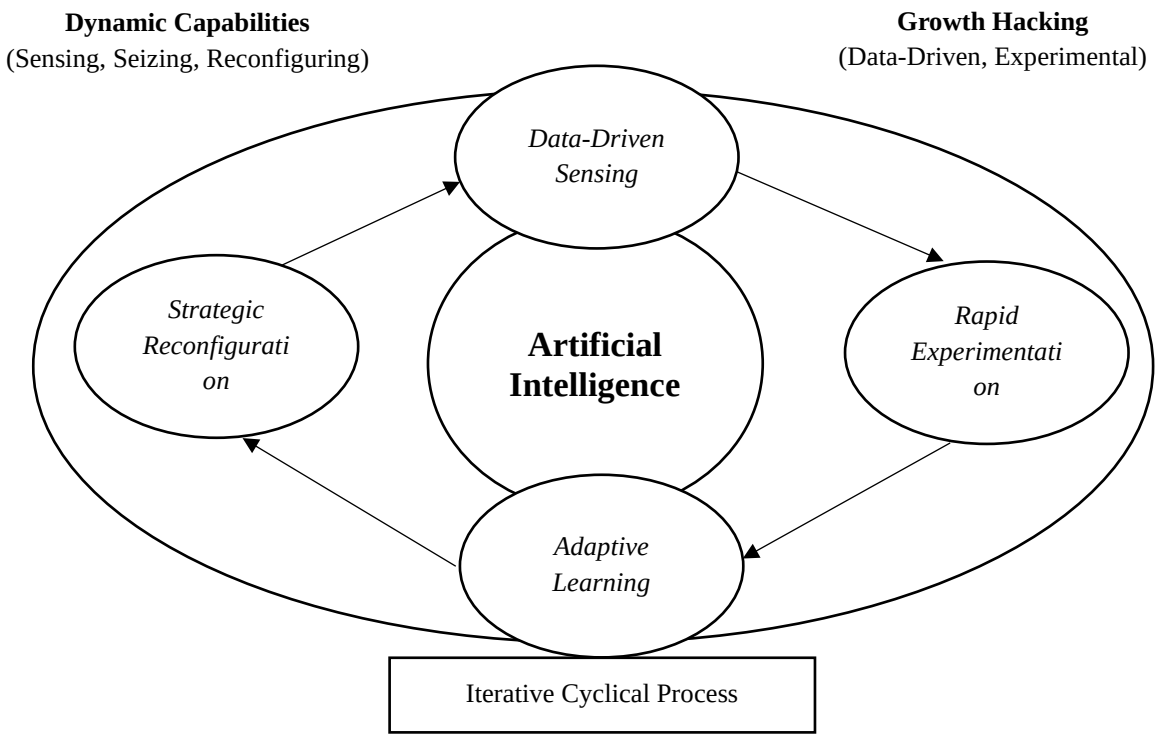
The third emerging theme concerns the organizational and contextual conditions that facilitate effective implementation of the integrated framework. Critical factors identified include: an organizational culture that values learning and experimentation; flexible organizational structures that foster cross-functional collaboration; governance systems that balance autonomy and strategic alignment; and complementary expertise in analytics, technology development, and business strategy. These contextual factors act as moderators in the relationship between GH, DCs, and innovation performance.

Finally, the analysis led to the development of a processual framework that illustrates how organizations can implement an integrated approach to GH, DCs, and AI. The framework identifies four iterative steps: (1) Data-Driven Sensing, the use of data and AI to identify emerging opportunities; (2) Rapid Experimentation, the design and implementation of targeted experiments; (3) Adaptive Learning, the extraction of insights from experiments and their integration into the organization's knowledge base; and (4) Strategic Reconfiguration, the reallocation of resources and revision of strategic priorities based on the knowledge generated. This cyclical process provides a practical mechanism

for the continuous development of dynamic capabilities through the application of artificial intelligence-enhanced growth hacking principles.

Figure 1 shows how GH, DCs, and AI integrate into a cyclical process with four main phases.

Fig. 1: Integrated Framework: Growth Hacking, Dynamic Capabilities and Artificial Intelligence



These findings contribute both to the theoretical literature on DCs and strategic innovation and to managerial practice in the digital economy. The framework developed offers a theoretical lens for understanding how organizations can develop adaptive capabilities in dynamic contexts and provides practical guidelines for managers seeking to implement data-driven approaches to strategic innovation.

Research Limitations. *The conceptual framework proposed in this study suffers from several methodological and theoretical limitations that warrant careful consideration. The purely conceptual nature of this research represents its fundamental limitation. While the theoretical integration of GH, DCs, and AI is grounded in established literature, the framework lacks empirical validation across diverse organizational contexts. Without empirical testing, the validity, boundary conditions, and practical utility of the framework remain speculative. Conceptual frameworks, though valuable for advancing theoretical development, inherently lack the robustness of empirically validated models.*

The rapidly evolving technological landscape introduces significant temporal constraints to the framework's applicability. AI technologies are advancing at an unprecedented pace, potentially rendering specific technical aspects of the framework obsolete even as the broader theoretical relationships may retain their validity. This technological fluidity creates substantial challenges for developing enduring theoretical propositions about AI's role in organizational capabilities and strategic management processes.

The framework also faces contextual limitations regarding its generalizability. Its effectiveness likely varies significantly across different industries, organizational sizes, and cultural contexts based on industry-specific dynamics, organizational maturity in digital capabilities, and regional variations in technological adoption. The current conceptualization does not sufficiently address these contingency factors that may moderate the proposed relationships between GH, DCs, and AI implementations.

Implementation complexities represent another significant limitation. The integration of GH methodologies, DC development processes, and AI technologies involves substantial organizational challenges related to cross-functional coordination, knowledge management, and change management. These practical integration challenges may be considerably more complex than the conceptual framework suggests, potentially limiting its practical utility for management practitioners seeking implementation guidance.

Although the framework proposes relationships between the three central constructs, the precise causal mechanisms, potential feedback loops, and interaction effects require further theoretical refinement and eventual empirical verification. The current framework does not fully explicate whether these relationships manifest as linear progressions, recursive cycles, or complex interactions moderated by other organizational factors.

Ethical and governance aspects receive insufficient attention in the current framework. The ethical implications of AI-enhanced growth hacking strategies-including privacy concerns, algorithmic bias, and transparency issues-represent crucial considerations for organizational implementation. Similarly, governance requirements for responsible AI deployment in strategic decision-making processes are not comprehensively addressed, creating potential blind spots in the framework's practical application.

Despite efforts to conduct a comprehensive literature review, selection biases may have influenced the conceptual development process. The interdisciplinary nature of this research domain creates challenges for ensuring complete coverage of relevant literature across management, information systems, and computer science disciplines. These potential biases may have shaped the theoretical relationships proposed in the framework.

Finally, the temporal context of this research reflects current knowledge paradigms in management and technology. Future paradigmatic shifts in either domain could significantly alter the theoretical foundations upon which this framework is constructed, potentially limiting its long-term relevance in rapidly evolving business and technological landscapes.

These limitations suggest several promising avenues for future research that could enhance both the theoretical robustness and practical utility of the proposed framework. Empirical studies should test the propositions embedded within this framework, employing both qualitative case studies to explore implementation processes and quantitative methods to measure performance outcomes. Longitudinal research designs would be particularly valuable for examining how the integration of GH, DCs, and AI evolves over time within organizations facing different competitive and technological environments. Research investigating contingency factors that influence the effectiveness of the framework across different contexts would significantly enhance understanding of its boundary conditions and improve its practical applicability. Studies examining variations across industries, organizational sizes, geographical regions, and cultural contexts could provide valuable insights into the contextual determinants of successful implementation.

Future scholarly work should explore the specific mechanisms through which AI technologies enhance the relationship between GH and DCs. This could involve process studies examining how AI-enabled data analytics and decision-making processes influence organizational learning and capability development. Understanding these mechanisms would strengthen the theoretical foundations of the framework and provide more nuanced guidance for implementation. Moreover, interdisciplinary research collaborations between management scholars, computer scientists, and ethics researchers could address the ethical and governance dimensions of implementing AI in strategic management processes. Such collaborations could develop guidelines for responsible AI deployment in organizational decision-making, addressing a significant gap in the current framework.

The limitations identified in this study do not diminish the potential contribution of this conceptual framework to our understanding of how organizations can navigate increasingly dynamic business environments. Rather, they highlight the need for continued theoretical refinement and empirical investigation to advance our understanding of how organizations can effectively leverage the integration of GH, DCs, and AI to enhance their competitive positioning in digital ecosystems.

Managerial Implications. *The findings of this study offer several significant implications for managers seeking to effectively navigate complex and rapidly changing business environments. These implications are particularly relevant for business leaders, innovation managers, and strategic decision makers.*

The proposed integrated framework provides managers with a practical model for implementing data-driven approaches to strategic innovation. By adopting the cyclical process of data-driven sensing, rapid experimentation, adaptive learning, and strategic reconfiguration, leaders can build more adaptive and responsive organizations. This approach requires a mindset shift by managers from traditional planning cycles to more agile and iterative decision-making processes. Managers should consider implementing strategic "sprints" that incorporate elements of growth hacking into their planning processes, enabling more frequent adaptations in response to emerging data.

The study highlights the importance of strategic investments in data analytics capabilities and AI technologies as a basis for developing DCs. Managers should critically assess the analytic maturity of their organizations and identify opportunities to improve data infrastructure and analytic skills. This does not necessarily require massive investments in cutting-edge technologies; incremental improvements in data quality, accessibility, and core analytic skills can also lead to significant competitive advantages. Organizations can develop tiered approaches to analytical capability building, starting with foundational data management practices before progressing to more sophisticated AI applications that drive predictive and prescriptive analytics.

The results underscore the importance of creating the right organizational conditions for effective implementation of the framework. Managers should focus on developing a culture that values learning and experimentation, in which failures are seen as learning opportunities rather than mistakes to be avoided. Flatter organizational structures and cross-functional teams can facilitate collaboration and integration of the skills needed to effectively implement GH approaches. Governance systems should balance the autonomy needed for rapid experimentation with the strategic alignment that ensures consistency of initiatives. Leadership plays a critical role in modeling experimental mindsets and protecting innovation initiatives from traditional organizational pressures for immediate returns on investment.

Moreover, the results highlight the importance of a balanced approach to innovation that integrates elements of exploration (identifying new opportunities) and exploitation (optimizing existing opportunities). The proposed framework enables organizations to pursue both goals simultaneously, using data and experimentation to continuously optimize

existing offerings as they explore new strategic directions. This ambidextrous approach requires thoughtful portfolio management, with explicit allocation of resources between initiatives focused on core business optimization and those pursuing more disruptive opportunities. Organizations can develop specialized teams with distinct metrics and governance structures appropriate to these different innovation horizons, while ensuring knowledge flows between explorative and exploitative activities.

By implementing these implications, managers can position their organizations to thrive in the digital economy by developing the ability to rapidly adapt to change and capitalize on emerging opportunities through a data- and experimentation-driven approach to strategic innovation.

Originality of the Paper. *The originality of this research lies in its novel integration of three distinct theoretical domains: GH, DCs, and AI. While previous literature has examined relationships between pairs of these constructs-such as AI's role in enhancing organizational capabilities (Raisch & Krakowski, 2021) or GH's contribution to organizational agility (Ellis & Brown, 2017)-this study represents the first comprehensive attempt to develop an integrated theoretical framework encompassing all three domains. The conceptual synthesis presented advances management theory by proposing specific mechanisms through which the experimental, data-driven approaches characteristic of GH can be enhanced by AI technologies to systematically develop DCs that sustain competitive advantage in turbulent environments.*

This research contributes to the DCs literature by extending Teece's (2007) sensing-seizing-transforming framework through the incorporation of GH methodologies and AI-enabled processes. Specifically, the framework proposes that AI-enhanced GH practices can significantly improve an organization's sensing capabilities through advanced pattern recognition in market data, enhance seizing capabilities through rapid experimentation and learning, and facilitate transforming capabilities through more efficient resource reconfiguration processes. This extension addresses Winter's (2003) criticism regarding the operational specificity of DCs by providing concrete mechanisms through which organizations can systematically develop higher-order capabilities.

Furthermore, this research advances the emerging literature on GH by providing theoretical grounding for its practices within established strategic management frameworks. By positioning GH as a potential antecedent to DCs development, the study elevates GH from a predominantly tactical marketing approach to a strategic organizational capability with implications for long-term competitive advantage. This theoretical repositioning responds to calls for stronger theoretical foundations in the GH literature (Cristofaro et al., 2025).

The study also makes a distinctive contribution to the literature on AI in strategic management by moving beyond technological determinism to examine how AI technologies interact with organizational processes and capabilities. Rather than treating AI as an exogenous technological force, this framework conceptualizes it as an endogenous element that both shapes and is shaped by organizational capabilities and strategic approaches. This conceptualization aligns with sociomaterial perspectives on technology (Orlikowski & Scott, 2008) and offers a more nuanced understanding of AI's strategic implications than prevailing technocentric approaches.

Additionally, the research offers methodological originality through its integrative literature review approach spanning multiple disciplines. By synthesizing insights from strategic management, marketing, information systems, and computer science literatures, this study demonstrates the value of cross-disciplinary integration in developing novel theoretical perspectives on contemporary management challenges, responding to calls for greater disciplinary integration in management research (Thorpe & Rawlinson, 2014).

The originality of this research lies not merely in its examination of emerging phenomena, but in its theoretical integration, extension of established frameworks, repositioning of emerging concepts within strategic management theory, and cross-disciplinary methodological approach. These contributions collectively advance our understanding of how organizations can develop sustainable competitive advantage in increasingly dynamic digital environments through the strategic integration of GH approaches, AI technologies, and DCs development processes.

Keywords: *Growth hacking; dynamic capabilities; artificial intelligence; strategic innovation; data-driven approach; organizational adaptability*

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Using Artificial Intelligence in Business-to-Business Sales Processes[1]

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Abstract

This short paper investigates the use of Artificial Intelligence (AI) in Business-to-Business (B-to-B) sales processes. AI technologies evolve rapidly and offer multiple benefits to companies who use them in an appropriate way. Our objective is to understand how companies can use AI to improve their B-to-B sales processes. We conducted a qualitative study based on semi-structured interviews with AI experts. Our findings show that the use of AI can automate and streamline sales tasks, and enhance customer interaction through personalized services and predictive customer behavior analytics. The implementation of AI tools can therefore lead to increased customer satisfaction and loyalty if it is aligned with the customer relationship policy of the company. Our study highlights the critical importance of ethical considerations concerning data privacy and data biases. We show that AI can optimize sales processes if ethical and trust issues as well as adaptations to customer expectations are addressed.

Framing of the research. *Artificial Intelligence (AI) leads to profound transformations in the way companies organize their activities and interact with their stakeholders. Due to its unique capabilities (Vannuccini & Prytkova, 2023), AI is becoming more integrated in organizational processes, products and services, with an almost "magical" appeal to companies and individual users (Campolo & Crawford, 2020). According to the Organization for Economic Co-operation and Development, "an AI system is a machine-based system that is capable of influencing the environment by producing an output (predictions, recommendations, or decisions) for a given set of objectives. It uses machine and/or human-based data and inputs to (i) perceive real and/or virtual environments; (ii) abstract these perceptions into models through analysis in an automated manner (e.g. with machine learning), or manually; and (iii) use model inference to formulate options for outcomes. AI systems are designed to operate with varying levels of autonomy"* (OECD, 2019).

In the field of management science, Raisch and Krakowski (2021: 192) define AI as "machines performing cognitive functions that are usually associated with human minds, such as learning, interacting, and problem-solving." Sestino and de Mauro (2022) conduct a literature review to identify the domains in which AI can be used by companies. They propose a comprehensive framework called "IAM (Implications, Applications, Methods)". Concerning the implications, AI can be used in automatization of routine tasks and enhance decision making through the analysis of vast amounts of data or the employment of chatbots. Companies need to consider ethical issues and the authors suggest the creation of a synergetic ecosystem between humans and AI. Concerning applications, AI can be used in multiple areas such as healthcare, finance and marketing, and it can contribute to the development of smarter manufacturing processes and enhanced resource management. Concerning the methods, AI provides predictive analytics that can be used for the forecasting of future trends such as sales forecasting, sentiment analysis and financial distress predictions. This forecasting can contribute to enhance information-based decision making. The capability of AI to recognize patterns or anomalies in data can help segmenting customers for targeted marketing campaigns, detecting frauds and improving risk management. Generative AI is able to perform better in some specific tasks than human beings.

Purpose of the paper. *In this "work-in-progress" paper, we investigate the use of Artificial Intelligence (AI) in Business-to-Business (B-to-B) sales processes, in which companies aim to facilitate interactions to build long-term relationships with their customers. In such processes, AI can contribute to cost efficiency and value creation, but it can also lead to value destruction if it is used inappropriately, for example in its connectivity or cognitive abilities (Canhoto & Clear, 2020). The objective of our paper is to understand how companies can use AI in B-to-B sales processes.*

Methodology. *We used a qualitative research design to investigate a largely unexplored phenomenon (Ghauri, Gronhaug & Strange, 2020). We conducted eight semi-structured interviews with AI experts to understand how companies can use AI in B-to-B sales processes. The interviews were conducted in April 2024 and their average duration was about one hour. We selected the participants based on their expertise in the field of AI. Table 1 presents the list of interviewees.*

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Table 1: List of interviewees

Interviewee	*Function*	*Key information & background*
Expert 1	*Professional in AI Consultancy*	*Former IT manager, transitioned to AI consultancy focusing on lead generation*
Expert 2	*Professor and Trainer*	*Specialized in leadership training, incorporates generative AI into training and research*
Expert 3	*PhD Student in Public Management*	*Researches AI's implementation in local authorities, focusing on public sector applications*
Expert 4	*PhD Student in HR Management*	*Researches AI in HR processes, interested in automation and its impact on human resources*
Expert 5	*Junior Professor in Economics of AI*	*Focuses on the economics of AI and innovation by exploringg AI applications*
Expert 6	*PhD Student and AI Coaching Entrepreneur*	*Entrepreneur, PhD Student, launched AI coaching startups, specializes in AI for leadership development*
Expert 7	*Cybersecurity Manager*	*Manages cybersecurity in a company, expert in AI applications*
Expert 8	*AI Business Applications Consultant*	*IT consultant, former academic, PhD in international business, specializes in AI applications*

We conducted semi-structured interviews to allow participants to share detailed narratives about their experiencesAll interviews were conducted with Google Meets, recorded in the Google application and retranscribed by the TurboScribe software. Table 2 presents the interview grid, which was elaborated based on our literature review.

Table 2: Interview grid

1. Introductory questions
Could you introduce yourself?
What is your job/research position, your major responsibilities?
What is your professional experience with AI?

2. Understanding AI and Business Practices
How do you view the impact of AI on business practices?
Can you highlight significant advancements in AI that have fundamentally changed business practices?
How do you anticipate that AI will evolve over the next decade, especially in their application to business practices?

3. AI's Impact on Business Processes
What areas of business operations do you see as having the highest potential for transformation through AI?
Could you share an experience, a case study or piece of research where AI significantly automated tasks or enhanced decision-making?
Which emerging AI applications do you predict will be crucial in business processes in the near future?

4. Ethical Considerations and Challenges
From your research or experience, what are the most pressing ethical considerations and challenges in implementing AI in companies?
How should companies address issues of bias and fairness in AI algorithms according to your findings or insights?
What strategies would you recommend to companies for overcoming these ethical challenges effectively?

5. AI in Enhancing Sales Processes
What specific challenges or issues within sales processes are companies aiming to address when they decide to integrate AI technologies?
In your observation, how have AI applications transformed sales processes within organizations?
What processes have proven effective in overcoming resistance to AI adoption among sales teams?
What are some examples where AI has significantly improved efficiency or outcomes in sales activities?
Have you identified any potential drawbacks or limitations of AI in sales decision-making in your research? If so, how do you propose to mitigate these issues?

6. Collaboration, Knowledge Sharing and Future Directions
Who typically leads the exploration and implementation of AI technologies for sales within organizations?
How is knowledge about effective AI applications in sales shared and spread within your organization?
Based on your experience or research, what potential drawbacks or limitations of AI in sales decision-making have you identified? How might these be mitigated?
How do organizations evaluate the effectiveness of AI applications in their sales processes, and can you provide an example of when a strategy had to be significantly adjusted?
What future trends in AI utilization within sales processes do you anticipate, and how should organizations prepare to adapt?
What advice would you give to organizations looking to leverage AI technologies to enhance their sales processes based on your insights?

We used a thematic analysis to identify key themes and patterns throughout the interviews (Ghauri, Gronhaug & Strange, 2020). All interviews were carefully analyzed to gain a deep understanding of the underlying mechanisms. We created initial codes to understand the structure of each interview and to get an overview of the emerging themes. We then identified the key themes and patterns before analyzing and structuring them carefully.

Results. *The analysis of our findings highlight how companies can use AI to improve B-to-B sales processes.*

Our interviews indicate that AI can increase automation and efficiency by analyzing large datasets, which can improve the lead generation and selection. Companies can therefore optimize sales strategies and improve conversion rates through AI.

"Certainly… the lead generation, it's another area that's really interesting. Of course… how you generate leads in terms of message, in terms of managing the interaction with leads, all these things can be automated. And of course, AI can help this automation, to be more performing." (Professor and Trainer)

Our data also shows that AI can enhance innovation in areas such as product development, marketing strategies and customer segmentation. The use of AI provides new ways of engaging with customers and markets. Also, the development cycle of new products can be accelerated, and products can be adapted faster to consumer needs and preferences. There are two ways how AI can provide capabilities that improve and accelerate innovation: "enabling" capabilities help companies to develop new skills and "enhancing" capabilities support companies to improve existing products. Thereby, AI can automate routine tasks, reinforce existing processes without removing the human contribution or reveal new insights or opportunities for innovation (Gama & Magistretti, 2023). AI can change the way how the target audience is reached and marketing campaigns can be personalized to increase customer satisfaction by showing them more relevant and engaging contents. Consequently, this can drive more customers to purchase the product. The data can also be used to strategize customer segmentation. The behavior, preferences and demographic information can be analyzed by AI to allow companies to develop highly targeted sales strategies.

"The first point is to be able to improve the understanding of the clients they are going to talk to. So it's kind of making all the data available, transforming something sales persons can read immediately in a very short and readable source. So if you are prepared and you know who you are going to talk to, it's going to improve enormously your productivity. You don't have to spend hours in trying to get information here and there." (Professor and Trainer)

The analysis also highlights the importance of aligning the use of AI in sales processes with the corporate strategy to achieve a satisfactory return on investment.

"If tomorrow you are the CEO and you decide to implement AI in your company, do you want to have a good ROI, a return on investment? Yes. That's why I told you first marketing, and second supply chain, and management controlling, etc. Because if you want to install AI in your company, you have obviously a return on investment in your AI. However, for one software, it's 500,000 euros. So it's not cheap." (PhD Student in HR Management)

Our findings show that companies should also consider ethical concerns and in particular bias and privacy concerns. AI can treat sensitive data in sales processes and this can lead to transparency and security issues. The way that sensitive client data is collected, used and stored is crucial for maintaining trust and compliance. Moreover, there exist possible biases inside the training data of AI algorithms. This can lead to unfair customer profiling or other discriminatory practices. In such situations, AI might evaluate the creditworthiness based on biased datasets. It is therefore important to be compliant with the law that outlines how AI can be used in organizations.

"First of all, to train people how it works. To be aware that there's going to be biases and what is the effect of the impact of these biases. And also, to be compliant with the law, I think is important. For example, in Europe, we have the AI Act. Yes. For example, so if they don't know how to use it or what the impact may be, refer to an ethical committee to be sure of that." (PhD Student in Public Management)

It is also necessary that the salesforce receives training to develop a deep understanding of AI capabilities and limitations (Faulconbridge, Sarwar & Spring, 2023). Salespeople can then fully leverage AI applications to increase their sales performance. Continuous learning initiatives are important to ensure that employees know the latest AI-tools and how to use them in their specific roles and functions. By educating the salesforce, the company can enhance the trust in technologies and provide employees the possibility to develop their competences, and thus to improve sales processes.

"You have to educate people, you have to explain them how they can use AI to improve what they're doing, right? That's what I'm doing with, you know, with coaches or with human resources. They were all afraid, but now today, they all want to be trained. They all want to use it because they understand they can do a better job. So, that's the thing. The way to remove fear is just to explain what are going to be benefits of AI and how they can use it. Education."(PhD Student and AI Coaching Entrepreneur)

AI allows to develop the level of personalization and to tailor interactions based on individual customer behaviors and preferences. This is achieved through high-level data analysis that informs marketing strategies and optimizes product offerings. AI can thus enhance customer engagement. In addition, AI-powered tools such as chatbots and virtual assistants are revolutionizing customer services. They can provide timely and useful responses and thus improve the overall customer satisfaction. Predictive analytics can anticipate customer needs and suggest proactive actions. This process can enhance the customer experience and loyalty. Companies integrate AI with CRM systems to deepen customer insights and improve sales through targeted marketing and personalized service offerings.

"So, customer relationship management or supports, right? So here AI is going to transform and potentially completely automate. It's already the case, you know, like the customer support and all these things, because, these are very much, you know, replicable patterns. So, you have a problem with the products, you have a question, you need some intervention." (PhD Student and AI Coaching Entrepreneur)

As suggested by Elshan, Ebel, Söllner and Leimeister (2023), companies could develop smart personal assistants based on AI by using low code platforms to make the user experience even more personalized. This step could drive customer interaction and satisfaction. The reshoring of tasks that had previously been outsourced to low cost countries highlights an important shift towards more technologically advanced solutions such as chatbots. These AI tools are not

just cost-effective but also bring operations closer to the core business and can even improve control over service quality.

"But customer service anyway, once again, economically speaking, if you are a company and you try to minimize your cost, so you know what has happened in previous times, people have, companies have externalized these services to developing countries because it costs less. Is it good, is it bad? But that's something that has happened. Now, a lot of these tasks are reshored because instead of somebody in a third party country, you can do it with the chatbot."(Junior Professor in Economics of AI)

Our findings further reveal that AI can tailor communication to individual preferences, which can significantly increase conversion rates and loyalty. AI continuously analyzes metrics and provides feedback for dynamic strategy adjustments. This integration improves operational efficiency and ncreases sales effectiveness in a competitive business environment. AI can optimize sales processes in multiple ways. The capabilities include providing detailed analytics and predictions that help in negotiation, automating customer follow-ups and decreasing the workload of sales teams. By handling these operational aspects, AI allows salespeople to use their time for more strategic activities, such as refining sales strategies or addressing complex issues with key clients.

"AI is going to give me the best possible reports, the best possible predictions. So, it's going to help me negotiate […]. Yes, and then it's going to help me do the follow-up process. So, as a salesperson, it can be very tiring. We see many salespeople not doing the right follow-up for the customers […]. So, the AI is going to help me go back to my customers so I can work on something that is more important, like strategic issues for my company. Or I can put my attention on more critical and deep problems with my most important customers. So, AI can play a critical role in many different moments of a sales process from investigation to closing. You can automate your prospection." (PhD Student and AI Coaching Entrepreneur)

Indeed, AI can simplify the logistical components of sales and it can also enrich the strategic aspects, which can help sales teams to engage more deeply and effectively with their customer base. The integration of AI into sales processes enhances efficiency, accuracy and personalization, which can result in significant improvements in customer relationship management and sales outcomes.

"Right now, it's helping to streamline the sales process. Likewise, it sometimes makes documents more professional. Quite simply, sales proposals are often 10-15 pages long and badly formatted. Having them reviewed by Al means they are in better shape, more presentable to the customer. And it saves an incredible amount of time, literally. It often takes 2-3 hours to draw up a sales proposal. With Al helping us by giving us the keywords and everything else we need to fill in, in half an hour, it's done." (Cybersecurity Practice Leader)

AI is able to take over the creation of sales documents, which is a time-consuming task. Through the automatization of the formatting and the content generation of sales proposals, AI can ensure a higher standard of document creation and also significantly reduce the time sales teams spend on these activities. This allows them to allocate more time to engage directly with clients or to improve sales strategies, and thus to increase productivity and to improve customer interactions. The efficiency brought by AI through document management underlines its value in optimizing various aspects of the sales process, from administrative tasks to client communication. AI can also improve customer relationship management, particularly with the use of chatbots. By automating customer interactions, chatbots provide immediate assistance, support and answers, which helps to augment the quality of the customer's experience by reducing wait times and delivering fast responses. This level of automation can improve customer satisfaction and optimize the workload of customer service teams who can then focus on more complex requests and tasks. The integration of AI can streamline operations and significantly improve the overall quality of customer services.

"Certainly, all the consumer relationship management. This is the most obvious part. So, all these interactions, the chatbots that guide the interaction with consumers in an automatic way, that makes the life of customers easier because they don't have to wait to talk with somebody."(Professor and Trainer)

Research limitations. *Our study presents several limitations that provide interesting research perspectives. It would be useful to collect additional data by interviewing suppliers and customers to capture the diversity of AI applications in B-to-B sales processes. Future research should also examine ethical and societal concerns such as the impact of AI on employment. Further investigation into the long term effects of AI on customer relationships and sales performance would help to to gain deeper insights into the sustainability of AI-driven strategies. It is necessary to develop robust frameworks that can adapt to new AI developments and evaluate their effectiveness in decreasing biases, ensuring privacy and maintaining trust in AI-powered sales practices.*

Managerial implications. *Our study shows that companies need to carefully manage the use of AI in B-to-B sales processes. They should align the implementation of AI with their strategic objectives to increase their return on investment. They need to prepare and train their sales teams so that they can fully leverage AI capabilities, but they should also consider ethical implications when using AI for customer relationship management.*

Originality of the paper. *In this short paper, we explore how companies can use AI to enhance B-to-B sales processes. Our findings show that AI can sustain the shift towards more intelligent, efficient and customer-centric business operations. AI revolutionizes the way businesses interact with their customers and enhances data-driven decision-making capabilities, which can contribute to improve sales performances and to develop new competitive advantages.*

Key words: *Artificial Intelligence, Sales Processes, Business-to-Business.*

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The Impact of AI Tool Usage on Student Well-Being in Higher Education: The Moderating Role of Self Efficacy

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Abstract

The increasing integration of artificial intelligence (AI) tools in higher education has raised critical questions about their impact on student well-being. This study examines the relationship between AI tool usage and well-being, with self-efficacy as a moderating variable. Grounded in positive psychology, the research differentiates between hedonic well-being, associated with immediate pleasure and life satisfaction, and eudaimonic well-being, which reflects personal growth and self-actualization.

Results indicate that AI tool usage negatively affects hedonic well-being unless moderated by high self-efficacy, which enables students to derive greater satisfaction from AI-assisted learning. Conversely, AI tool usage alone does not significantly influence eudaimonic well-being, but when self-efficacy is high, students experience enhanced psychological flourishing. These findings highlight self-efficacy as a crucial determinant in maximizing AI's benefits, shaping students' ability to transform technology into a tool for both subjective happiness and long-term self-development.

This study underscores the importance of analyzing the distinct effects of AI on hedonic and eudaimonic well-being, as their underlying mechanisms differ. The insights contribute to educational strategies aimed at fostering digital competence and psychological resilience in AI-enhanced learning environments.

Framing of the research. *The proliferation of artificial intelligence (AI) in educational settings has emerged as a pivotal area of study within the academic and technological communities (Chen et al., 2020). AI technologies, encompassing systems such as adaptive learning platforms, AI-driven tutoring systems and data analytics, are increasingly being integrated into university environments to enhance the learning experience and operational efficiencies. While substantial research has focused on the pedagogical and administrative advantages of these tools (Timms, 2016; Chassignol et al., 2018), less attention has been given to their broader impacts on the well-being of users-students.*

The educational environment offers a unique context for studying the impact of AI on well-being. As universities increasingly adopt AI tools for various functions, from personalized learning to administrative automation, understanding how these technologies affect the well-being of their primary stakeholders-students-becomes crucial.

The implementation of these tools has demonstrated considerable effectiveness and practicality. However, their adoption is not without drawbacks, as the potential for adverse effects remains a critical concern. As is often the case with emerging technologies, the risk of dependency is substantial (Diener et al., 1999; Kwon et al., 2016). Therefore, striking a balance between the benefits and the potential downsides of their usage presents a significant challenge.

Gaining a deeper understanding of how these technologies impact end-users' overall well-being is essential, especially given the rising usage rates among younger generations, including university students.

The current literature indicates a growing prevalence of AI in education but lacks a comprehensive examination of its implications for individuals' well-being, particularly through the lenses of eudaimonic and hedonic perspectives.

This research seeks to explore the effects of AI tool utilization on individual well-being within the context of higher education, providing a nuanced analysis of both psychological and subjective well-being. To anchor this investigation, we draw upon established theories in positive psychology (Ryff et al., 2021), which distinguish between two primary forms of well-being: eudaimonic and hedonic well-being.

Eudaimonic Well-Being sees its origin in the Greek term 'eudaimonia', which translates to 'human flourishing', eudaimonic well-being - also called psychological wellbeing- is deeply rooted in the realization of personal potential and intrinsic growth. According to Waterman (1993), based on the theory of eudaimonia, eudaimonic well-being encompasses the degree to which an individual is living in accordance with their 'daimon', or true self, thereby achieving personal excellence and their true potential. This concept is further elaborated by Ryff (1989), who identifies six key components

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of eudaimonic well-being: autonomy, personal growth, purpose in life, environmental mastery, positive relatedness, and self-acceptance. Each component represents a facet of an individual's capacity to lead a rich and fulfilling life.

Hedonic Well-Being, conversely, often referred to as subjective well-being, focuses on happiness and life satisfaction. This dimension of well-being is primarily concerned with the accumulation of pleasure and the avoidance of pain, as described by Ahuvia and Friedman (1998). It emphasizes two main aspects: the overall life satisfaction and the presence of positive emotional experiences. This perspective on well-being highlights the immediate affective outcomes of engaging with life's experiences.

This study examines self-efficacy as a moderating factor in the relationship between AI tool usage and student well-being, distinguishing between eudaimonic and hedonic dimensions.

From the perspective of self-actualization-encompassing the realization of one's true self, potential, and positive experiences-the influence of psychological motivation theories and social cognition (Bandura, 1977) on the literature becomes evident, particularly through the introduction of the self-efficacy construct.

Self-efficacy, classified as a competence belief, refers to an individual's confidence in their ability to handle future situations or tasks effectively. Over the past decade, research on student self-efficacy has gained increasing prominence in the fields of academic motivation and achievement (Schunk et al., 2014). Bandura posited that self-efficacy shapes individuals' choices, effort levels, and persistence. Specifically, individuals with low self-efficacy regarding a given task tend to avoid it, whereas those who perceive themselves as capable are more likely to engage actively.

Furthermore, Nyberg et al. (2022) highlight a positive correlation between knowledge and self-efficacy, identifying it as a key predictor of performance. They associate scientific competence with self-efficacy, which they define as comprising two dimensions: knowledge of scientific content and the ability to engage in scientific reasoning. Their findings reinforce the notion that self-efficacy extends beyond academic performance, influencing motivational processes, self-regulation strategies, self-perception, and personal interests. These conclusions align with earlier research by Bandura & Schunk (1981), Klassen & Usher (2010), Pajares & Valiante (1997), and Schunk (1995), which collectively underscore the pivotal role of self-efficacy in shaping both academic and psychological outcomes.

The theory of self-efficacy is considered a fundamental theoretical contribution to the study of academic achievement, motivation, and learning (Pajares, 1996; Schunk, 1991).

Several studies have consistently shown how self-efficacy influences people's willingness to adopt new technologies (Holden et al., 2011; Zhang et al., 2017; Ellen et al., 1991). People who believe in their ability to use technology tend to be more motivated and confident in achieving good outcomes, in contrast to those who doubt their technological abilities (Noe and Wilk, 1993; Tannenbaum et al., 1991). In addition, people who feel competent with technology are more engaged, have more positive attitudes towards using technology-based services, and are more likely to continue using them than those who are less confident in their technological abilities (Dabholkar and Bagozzi, 2002).

Despite the increasing integration of AI technologies in educational settings, there remains a significant gap in empirical research concerning their impact on well-being. Existing studies (George and Wooden, 2023; Al-Surmi et al., 2022) have primarily concentrated on AI's role in enhancing learning outcomes and operational efficiency without adequately addressing the psychological and emotional states of the users. This oversight is notable, especially given the rising concern about mental health in academic environments globally.

Purpose of the paper. *This research aims to fill this gap by focusing on the direct and indirect effects of the use of AI tools on the well-being of university students, considering varying degrees of interaction with AI technologies. By adopting a longitudinal approach, the study intends to capture the dynamic changes in well-being over time, providing insights into the transient and lasting effects of AI on human flourishing and satisfaction.*

Given this background, our research aims to investigate the moderating effect of self-efficacy on the relationship between AI tool usage and the two forms of well-being. Specifically, we seek to understand how varying levels of self-efficacy influence students' ability to benefit from AI tools in terms of their psychological (eudaimonic) and subjective (hedonic) well-being. By examining this relationship across all levels of self-efficacy, we aim to provide a comprehensive analysis that could inform targeted interventions designed to enhance the effective use of AI tools in educational settings, thereby maximizing the well-being outcomes for all students.

We want to investigate how the educational context - and individual's wellbeing - shifts when new digital technologies and AI-based tools are employed by students in order to learn.

Methodology. *This study employed a quantitative research methodology to explore the effects of the use of artificial intelligence (AI) tools on individuals. We conducted a survey with students enrolled in an economics course in a major Italian university.*

At the beginning of the semester, the students were informed that they could take part in a series of surveys in exchange for extra credits. During the semester, the students were encouraged to use ChatGPT to help develop some of the assignments of the course. We collected 4 observations from the students at specific time intervals which aligned with the submission of the assessments. The survey was formed of four sections.

First, we adapted a usage intention two items scale originally developed by Venkatesh and Davis (2000) which utilizes a 2 items 7-point Likert scale ranging from 1 (not at all true) to 7 (very true).

Secondly, the students were asked to assess their level of wellbeing by answering a 8 items 7 points scale where 1 = Strongly agree and 7 = strongly disagree (Jian et al., 2019). An example of the adapted items for hedonic well-being is "Using ChatGPT makes my life more satisfying", while for eudaimonic well-being "Using ChatGPT brings me closer to my ideal self ". The chosen scale combines items from various established scales to measure consumer hedonic well-being, specifically incorporating four items from the work of Pavot and Diener (1993) and Argyle and Jill (1989). For assessing consumer eudaimonic well-being, the scale includes four items focused on self-actualization and self-affirmation, adapted from the methodologies of Ryff (1989) and Waterman (1993).

Moreover, to measure self-efficacy regarding the use of AI tools, we employed the short form of the General Self-Efficacy Scale (GSE-6) developed by Romppel et al. (2013), consisting of 10 items. An example of item is "It is easy for me to stick to my aims and accomplish my goals".

Finally, demographic information pertaining to the respondents was collected.

Results. *The study was conducted with a sample of 291 students. The demographics of our respondents were predominantly female, with 163 females (56%) and 123 males (42.3%) participating in the survey. A small number, 4 respondents (1.4%), chose not to disclose their gender. The average age of the participants was 21 years, aligning with the typical age range of university students.*

The data collection involved four distinct surveys. The first survey received 87 responses, the second 77, the third 67 and the fourth, and last one, 60 responses.

A preliminary analysis was conducted to explore the long-term effects of AI-based tool usage on well-being. However, the longitudinal analysis yielded results that were not statistically significant, and thus the dataset was analyzed in an aggregated form.

The regression analysis was conducted using the PROCESS macro for SPSS to explore the impact of artificial intelligence tool usage on the dependent variables (subjective hedonic well-being and psychological eudaimonic well-being), with self-efficacy serving as a moderator in this relationship, using the model 1 proposed by Hayes (2017).

Firstly, we analyzed the hedonic well-being and we noticed that the sample comprised 291 respondents, and the model was proven to be significative ($p < 0.0001$).

We discovered that increased usage of AI tools was associated with a decrease in the levels of hedonic well-being ($\beta = -0.6945$, $p = 0.0054$).

Moreover, the interaction between AI tool usage and self-efficacy was statistically significant ($\beta = 0.2215$, $p < 0.0001$), indicating that the effect of AI tool usage on hedonic well-being varies depending on the level of self-efficacy.

Consistent with our hypothesis, the findings highlight that self-efficacy significantly moderates the impact of AI tool usage on hedonic well-being. To identify the specific values of self-efficacy where the relationship between AI tool usage and hedonic well-being was statistically significant ($\alpha = 0.05$ criterion), we employed the Johnson-Neyman technique (Johnson and Neyman, 1936). More in detail, this technique identifies regions in the range of the self-efficacy variable where the effect of the usage (our predictor) on the hedonic well-being is statistically significant. Results of this analysis revealed the self-efficacy levels of 3,7865 as a transition point.

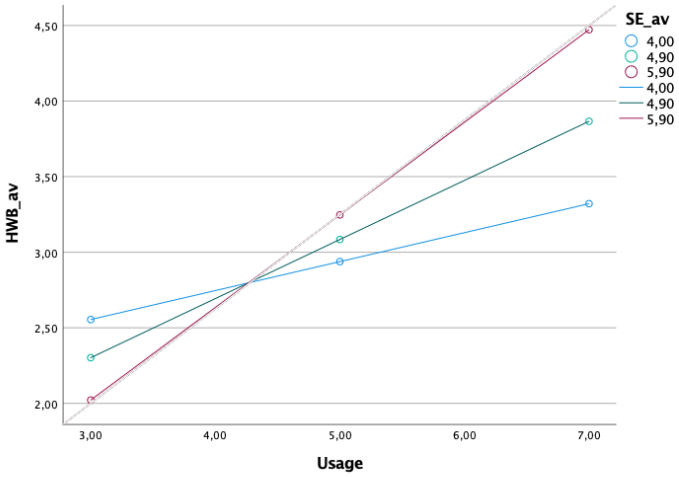
Upon surpassing the established threshold value, the relationship between AI tool usage and hedonic well-being (HWB) becomes statistically significant, and two distinct patterns emerge as depicted in the Diagram 1.

When self-efficacy is at level above the threshold of 3,7865, the effect of Usage becomes positive and significant. Individuals with high self-efficacy benefit from the usage of AI tools in terms of hedonic well-being, the higher the self-efficacy level and the higher their wellbeing levels.

As self-efficacy slightly decreases (while still remaining above the significance threshold), the moderating effect also weakens, still indicating a positive moderating effect, that decreases with lower self-efficacy levels.

Therefore, higher self-efficacy is associated with a stronger moderating effect.

Fig. 1: Self Efficacy's moderating role on Hedonic Well-being



Source: Our elaboration

We conducted the same analysis to investigate the relationship between usage and eudaimonic -psychological - wellbeing, withself-efficacy as a moderator.

Differently from hedonic well-being, the effect of Usage on the dependent variable eudaimonic well-being was not significant on its own, as indicated by a p-value of 0.3823.

Moreover, the effect of self-efficacy on eudaimonic well-being was not statistically significant (β = -0.4949, p = 0.0635), suggesting that, by itself, self-efficacy has a marginal negative impact on eudaimonic well-being, which was not definitive in this model.

However, when self-efficacy was introduced as a moderating variable, the interaction between Usage and self-efficacy became positive and significant (p = 0.0483).

Thus, the effect of usage and eudaimonic wellbeing depends on the level of self-efficacy.

Results of the Johnson-Neyman technique identified the self-efficacy level of 3.7152 as a transition point.

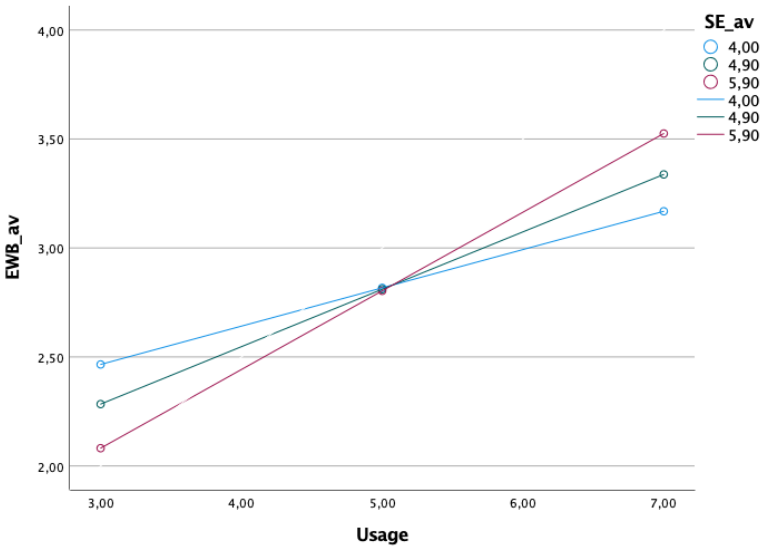
Specifically, as shown in Diagram 2, the conditional effects analysis demonstrated increasing positive effects of AI tool usage on eudaimonic well-being at higher levels of self-efficacy:

At a self-efficacy value of 4.0, the effect of Usage on EWB_av was slightly positive (β = 0.1757, p = 0.0073).

The effect was stronger at a self-efficacy of 4.9 (β = 0.2635, p < 0.0001).

At a self-efficacy level of 7 (the maximum on the Likert scale), use has a very strong effect (0.4683), suggesting that people with high self-efficacy benefit greatly from using AI in terms of eudaimonic well-being. The moderating effect, in this case, appears to be weaker than the one that affects hedonic wellbeing.

Fig. 2: Self Efficacy's moderating role on Eudaimonic Well-being



Source: Our elaboration

The differing results observed in the two well-being dimensions can be attributed to the inherent differences in what hedonic and eudaimonic scales measure:

Hedonic Well-being: The analysis showed that the main effects of AI tool usage and self-efficacy were both negative, but significative, though the interaction effect was positive. This suggests that while the immediate gratification associated with AI tool usage does not generally increase without consideration of self-efficacy, it can improve under certain conditions, specifically at higher levels of self-efficacy. This indicates that merely using AI tools doesn't automatically lead to increased pleasure or satisfaction - hence hedonic wellbeing; instead, how users feel capable and confident (higher levels of self-efficacy) in using these tools plays a crucial role.

Eudaimonic Well-being: The results did not demonstrate a significant relationship between AI tool usage and well-being, but when moderated by self-efficacy, the effect on eudaimonic wellbeing is confirmed. The higher an individual's self-efficacy, the stronger the effect on well-being. Thus, confirming that eudaimonic well-being is only positively affected by the use of AI for those who have sufficient self-efficacy to use the technology effectively and productively.

Self-efficacy appears to be a more crucial factor for eudaimonic outcomes than hedonic ones. Higher self-efficacy helps individuals utilize tools in a way that aligns with their personal growth goals, thus enhancing eudaimonic well-being. In contrast, hedonic satisfaction might not require the same level of personal competence or confidence, being more dependent on the immediate benefits provided by the tools and amplified by the self-efficacy.

The usage of AI tools might enhance how individuals perceive their capabilities and future potential, thereby more significantly impacting eudaimonic well-being. Hedonic pleasure may not be as deeply influenced by these cognitive and self-reflective processes.

Research limitations. *Despite the contributions, this paper also has some limitations worth noting.*

Firstly, the research focuses on university students enrolled in an economics course at a single Italian university. Although their experiences offer valuable insights into how AI can affect student well-being in educational environments, these findings might not apply to students in other fields, different universities, other cultural contexts, and background. Future research should replicate this study across diverse educational backgrounds and international settings to enhance external validity.

Secondly, this study was conducted as a natural experiment, thus the setup was not fully controlled. Students were simply encouraged to use AI tools for their schoolwork and assignments but were not randomly assigned to treatment and control groups. Consequently, while the findings suggest meaningful relationships between AI usage, self-efficacy, and well-being, causality cannot be firmly established. A more controlled experimental design, incorporating randomized trials, could help validate the causal effects.

Thirdly, this study mainly uses self-reported data, which may be influenced by social desirability bias or subjective interpretations of well-being and self-efficacy. To gain deeper insights into the psychological mechanisms underlying these relationships, future research could integrate neuromarketing techniques, such as biometric or neurophysiological measures (e.g., EEG, eye tracking, skin conductance), to assess users' emotional and cognitive responses to AI interactions more objectively.

Lastly, while the study distinguishes between hedonic and eudaimonic well-being, the observed differences in the effects of AI usage on these two dimensions warrant further exploration. The results indicate that hedonic well-being is more directly influenced by AI tool usage, whereas eudaimonic well-being benefits primarily from high self-efficacy. However, the underlying psychological and behavioral mechanisms driving these differences remain unclear.

Future research should employ a more nuanced approach, potentially integrating mixed-methods designs, to dissect the pathways through which AI interacts with different aspects of well-being.

Managerial implications. *The findings of this study present critical managerial implications for universities and policymakers striving to integrate AI tools into educational environments while safeguarding student well-being. A strategic, student-centered approach is essential to maximizing AI's benefits while mitigating potential drawbacks.*

One key implication relates to enhancing technological self-efficacy through structured training programs. Given that higher self-efficacy mitigates the negative impact of AI usage on hedonic well-being and enhances eudaimonic well-being, universities should invest in initiatives that build students' confidence in using AI tools. Workshops, digital literacy courses, and hands-on AI-assisted assignments can empower students, reduce resistance, and foster engagement. For instance, universities could implement AI onboarding programs modeled after corporate digital skill-building courses, ensuring that students develop both technical competence and confidence in AI interactions.

Another crucial consideration is the implementation of personalized AI learning pathways. AI tools should not follow a one-size-fits-all model but should be adapted to students' varying levels of technological competence and self-efficacy. Universities can design customized learning experiences that allow students with higher self-efficacy to explore advanced AI functionalities while providing foundational support to those with lower confidence levels. Adaptive AI-driven platforms, such as intelligent tutoring systems, should incorporate real-time self-efficacy assessments to dynamically adjust learning difficulty, ensuring that AI enhances learning rather than exacerbates skill gaps.

As AI technologies become more embedded in education, the establishment of clear ethical guidelines and usage policies is increasingly relevant. Universities must implement frameworks that encourage responsible AI use and prevent over-reliance, particularly among students with lower self-efficacy, who may struggle to balance AI assistance with independent learning. For example, institutions could introduce AI literacy modules akin to academic integrity courses, equipping students with the necessary skills to navigate AI tools while fostering critical thinking and problem-solving abilities.

The need to monitor AI's impact on student well-being through systematic feedback mechanisms is also paramount. Universities should develop longitudinal assessment frameworks that track the psychological and academic effects of AI tools, allowing for data-driven decisions on AI integration. By collecting continuous feedback through surveys, focus groups, and engagement analytics, institutions can proactively refine AI strategies. AI learning dashboards, for instance, could incorporate well-being indicators that enable educators to assess student engagement levels and adjust AI interventions accordingly.

Maximizing the benefits of AI tools while mitigating risks requires fostering interdisciplinary collaboration between education, psychology, computer science, and business departments. A cross-disciplinary approach ensures that AI adoption strategies are holistically designed, balancing technological efficiency with human-centric factors such as motivation, self-efficacy, and overall well-being. For instance, psychology experts could collaborate with AI developers to design intuitive interfaces that enhance engagement without inducing cognitive overload or stress, thereby optimizing the learning experience.

Since self-efficacy levels vary among students, universities should also develop tailored AI adoption strategies that address individual needs. Students with high self-efficacy should have access to advanced AI tools for research, data analysis, and complex problem-solving, while those with lower self-efficacy should receive structured guidance,

mentorship programs, and AI-assisted learning tutorials that build confidence over time. A differentiated approach to AI integration ensures that all students, regardless of their technological competence, can fully leverage AI's potential without experiencing disengagement or frustration.

By integrating these strategic interventions, universities can leverage AI technologies to optimize student learning experiences while safeguarding psychological well-being. A student-centered AI adoption model-one that incorporates technological competence, adaptive learning, and self-efficacy-driven support-ensures that AI becomes a tool for enhancing not only academic success but also holistic personal development in higher education.

Originality of the paper. *The originality of this paper lies in its nuanced exploration of the differential impacts of artificial intelligence (AI) tool usage on the two distinct dimensions of well-being-hedonic and eudaimonic-in the context of higher education. While considerable research has investigated the broad effects of AI on learning outcomes and operational efficiencies, this study contributes to the literature by specifically examining how varying levels of self-efficacy influence these well-being outcomes when interacting with AI technologies, highlighting also the difference emerged in the two different kinds of wellbeing.*

One of the novel findings of this research is the significant negative impact of AI tool usage on hedonic well-being, while when the effect is moderated by self-efficacy the overall effects turns positive, enhancing students' hedonic wellbeing.

This is in contrast to eudaimonic well-being, where AI tool usage did not show a direct significant effect of the AI tools usage on it, but did so when moderated by self-efficacy. This distinction underscores the critical role of self-efficacy not only in facilitating effective engagement with technology but also in enhancing the personal growth and psychological well-being of students.

Furthermore, this paper is among the first to articulate and empirically test the moderating role of self-efficacy on the relationship between AI tool usage and both types of well-being in an educational setting. The findings highlight that while the use of AI tools can diminish hedonic well-being overall, higher levels of self-efficacy can reverse this effect, leading to increased life satisfaction and positive affective states. This interaction suggests that self-efficacy is a pivotal factor in ensuring that the integration of AI technologies into educational processes contributes positively to student well-being.

This research, therefore, not only contributes to the academic literature by providing empirical evidence of the nuanced impacts of AI on different types of well-being but also offers practical insights for educational leaders aiming to implement AI tools in a manner that maximizes student engagement and well-being.

Key words: *Artificial Intelligence; Well-Being; Self Efficacy; Education*

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Track 2
Entrepreneurship

Female Entrepreneurship: overcoming barriers and expanding theoretical perspectives for inclusive growth

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Abstract

Female entrepreneurship is increasingly acknowledged as a key driver of economic growth and social impact. However, women continue to face significant challenges in this domain. Despite its growing relevance, female entrepreneurship has yet to be fully recognized as an autonomous research subject. The existing literature predominantly emphasizes quantitative analyses, often neglecting the application of theoretical frameworks that could provide deeper insights into the phenomenon. This work-in-progress seeks to address this gap by pursuing three main objectives: (i) identifying the barriers and obstacles that hinder female entrepreneurship, (ii) analyzing these challenges through the lens of various theoretical perspectives from prior studies, and (iii) integrating these perspectives to develop a more comprehensive and synthesized body of knowledge.

Framing of the research. *Studies on women entrepreneurship have noticed a rapid growth over the past 30 years; the field is in an initial phase but with a considerable number of journal articles, literature reviews and books being published on women entrepreneurs.*

For decades, entrepreneurship research has been dominated by a male-centric perspective, treating the male entrepreneur as the default model for business ventures. This bias shaped the field from its origins in the 1930s, with the assumption that male and female entrepreneurs were fundamentally the same-an oversight that delayed the recognition of women entrepreneurship as a legitimate research subject (Bruni et al., 2004). It was not until the late 1990s and early 2000s, with the launch of dedicated conferences such as the 1998 Conference on Women Entrepreneurs in Small and Medium-Sized Enterprises and the 2003 Diana International Conference, that the study of women entrepreneurs began to gain momentum (Jennings & Brush, 2013).

The traditional business model was long considered gender-neutral, yet research on women entrepreneurs has shattered this illusion, revealing that entrepreneurship is inherently gendered and often embedded within family dynamics (Jennings & Brush, 2013). This realization has led to an increasing recognition that women are not merely participants in entrepreneurship but are key drivers of economic and social transformation (Sarfaraz et al., 2014).

Despite this progress, mainstream entrepreneurship theories remain outdated, failing to account for the structural barriers, unique motivations, and alternative business models that characterize female-led ventures. Theoretical frameworks must evolve to reflect the realities of women entrepreneurs, rather than treating them as deviations from a male norm (Yadav et al., 2016).

The stakes are high. Women entrepreneurs do not just contribute to economic growth-they reshape social and familial structures, elevate their communities, and challenge entrenched power dynamics (Kaviarasu et al., 2022; Sajjad et al., 2020). A failure to critically engage with female entrepreneurship as a distinct and transformative force risks perpetuating the very inequalities that have historically sidelined women in business. It is not just about inclusion-it is about rewriting the narrative of entrepreneurship itself.

Women entrepreneurs contribute to creating employment opportunities, leading to income increase, and more new products and services available to society leading to greater benefits for society, in addition are more likely to reinvest the money they earn leading to an increase in the local economy (Atonye et al., 2024). Therefore, investing in women entrepreneurship helps in closing the gender gap, as research suggests that women owners are more likely to hire women employees (Quak et al., 2022).

Despite this, women entrepreneurs still face numerous challenges (Kaviarasu et al., 2022), the number of women-owned businesses is still in the minority and the challenges faced by them are relatively different from the challenges faced by men-owned businesses (Strawser et al., 2021).

Nonetheless, Anderson and Ojediran (2022) highlight a peculiar characteristic of female entrepreneurship: women in developed countries are attracted by opportunities, whereas those in developing countries seem to be pushed by necessity.

However, literature identifies in general, seven main barriers:

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1. *Gender discrimination (Albattat et al. 2023)*
2. *Work-family conflict (Ahmetaj et al. 2023)*
3. *Financial obstacles (Albattat et al. 2023)*
4. *Lack of infrastructural support (Ramadani et al. 2015)*
5. *Unfavourable business, economic and political environments (Zhu et al. 2015)*
6. *Lack of entrepreneurship training and education (Sengupta et al. 2013)*
7. *Personality-based barriers (fear of failure and low self-confidence) (Al-Sadi et al. 2011)*

The lack of access is caused by gender discrimination in the financial market in which they operate (Vita et al., 2023). Moreover, research has also shown that institutional support plays a vital role in the development of women entrepreneurship. Traditional gender roles and cultural roles have also been identified by researchers to be a challenge for women entrepreneurs (Patel & Deshpande, 2018).

One of the greatest difficulties for the recognition of female entrepreneurship as an autonomous research subject is certainly a lack of theoretical concepts of the phenomenon: most studies focus on exclusively quantitative analyses, and few analyses study the phenomenon through theoretical lenses.

Theoretical frameworks such as feminist epistemology highlight the barriers women face in entrepreneurship, emphasizing the need to challenge male-dominated norms and advocate for gender equity in business contexts, but linking feminist theories to entrepreneurship reveals that existing research often adopts a feminist empiricism perspective, which may inadvertently reinforce women's subordination by failing to question male norms (Wu et al. 2019).

The application of critical theory on female entrepreneurships seems to highlight a lack of universality, this narrow focus can be seen as limiting, in particular in a globalized world with different social and cultural contexts (Said, 1993), furthermore the influence of postmodernist thought in critical theory can lead to a form of relativism that underestimates the potential for a shared understanding of justice and ethical norms, making it difficult to ground objective criteria for critique (Lyotard, 1984). The emphasis on data collection and analysis without a strong pre-existing theoretical framework of the Grounded Theory can sometimes lead to superficial findings or theories that lack strong theoretical foundation (Bryant et al. 2007), thus the theoretical support necessary for female entrepreneurship to be recognized as an autonomous research subject is lacking; in addition building theory from data leads a risk that researchers might over-interpret data or make claims that are not adequately supported by the evidence. This can bring to theories that are speculative or not grounded enough in the data itself (Glaser et al. 1967).

Purpose of the paper. *Literature recognizes the importance of female entrepreneurship, both in terms of economic growth and for its strong social impact. However, to recognize female entrepreneurship as an autonomous research subject, more contributions on theoretical concepts of the phenomenon are needed. At the moment, and as previously written, most of the studies deal with exclusively quantitative analyses using little or no theoretical lenses.*

The aim of our work is to identify the barriers and obstacles to female entrepreneurship and to analyse the different theoretical perspectives applied to the study of these barriers on the different levels of analysis: micro, meso and macro:

- *Micro Level: psychological constraints, internal doubts and insecurities of women with respect to their capabilities and strengths; feelings of isolation.*
- *Meso Level: firm's structure and organization and their relationships with trade associations or banks which they promote entrepreneurship development*
- *Macro Level: institutional context and social policies which they support female entrepreneurship.*

This contribution aims not only to increase knowledge about barriers and obstacles to female entrepreneurship, but also wants to enhance the theoretical knowledge related to women entrepreneurship.

Methodology. *Literature reviews identify important knowledge gaps and motivate researchers to fill them (Webster & Watson, 2002). In this paper, we aim to conduct a systematic literature review (Cook, Mulrow, & Haynes, 1997) of relevant studies examining the barriers and obstacles to female entrepreneurship. In this sense, according to Tranfield, Denyer, and Smart (2003), to more clearly establish the conceptual boundaries, we first examined pertinent findings that were published in Management publications (select studies that applied Tranfield et al. (2003) approach are: Hoskisson, Chirico, Zyung, & Gambeta, 2017; Terjesen, Hessels, & Li, 2016). Then, we used Scopus database to search for all articles published from all years to present (March 2025) using the search terms, [women or female and entrepreneur* and incl* and barr* or obstacl*]. Manually tracking citations for additional relevant articles in highly ranked journals is an important part of the literature review (Rashman, Withers, & Hartley, 2009); however, the manual search did not produce any additional contribution on the topic.*

We searched on Scopus database widely recognized in the scientific community, with more than 27 million abstracts, and is currently considered the largest database of scientific literature (Burnham, 2006), using the phrases [women or female and entrepreneur and incl* and barr* or obstacl*], in [Article title, abstract keywords], and obtained 413 works.*

We then limited the research to Subject Area (1) [Business, Management and Accounting], using [LIMIT TO].

Considering their internal criteria, the suggestion is to use the command [LIMIT TO] to filter the [SUBJECT AREA] because it is a more inclusive command. In this step, we obtained 155 documents.

The Scopus Database includes different types of documents, including articles, book chapters, articles in press, books, and reviews. According to our research protocol, the systematic review included only articles and reviews published on journals in English at the final stage. We therefore excluded the other documents. We used both commands and

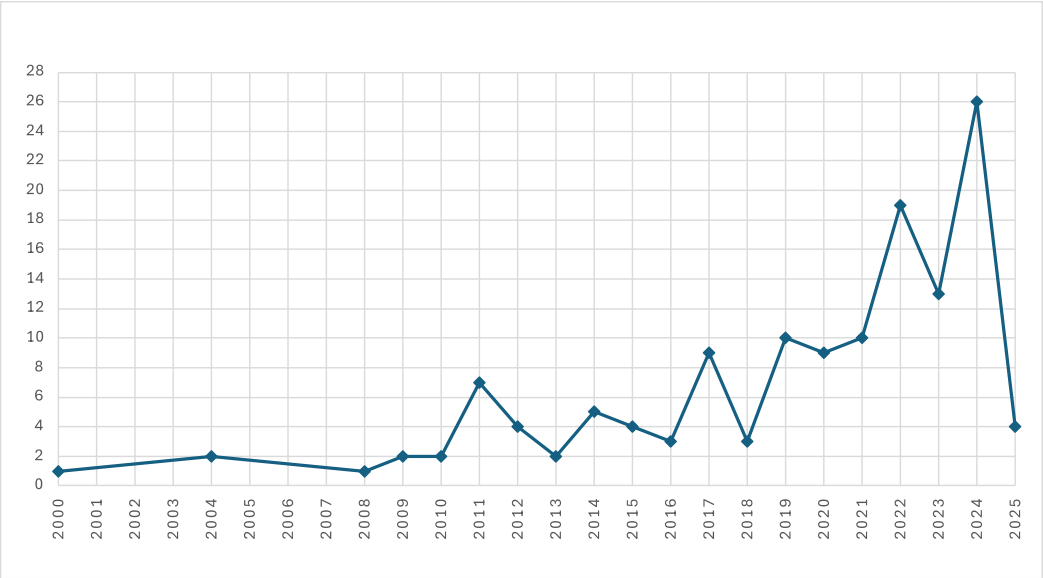
determined that in this case, use of either of the commands, [LIMIT TO (selected items)] or [EXCLUDE (selected items)], with 139 articles.

The bibliometric method known as VOSviewer software version 1.6.10 (Van Eck and Waltman, 2010, 2014) was also employed. This software enables the visual description, recognition, and categorization of groups in a related strategic matrix according to their similarities and differences (distance based mapping). This approach addresses the issue of author subjectivity influencing the qualitative study of the literature. It is possible to lessen the distortion caused by subjective variables by using the authors' own keywords. Additionally, the graphic creation of maps enables the examination of the intricate relationships between the variables, which aids in a better understanding of the nature of a research field and has become an unquestionable analysis tool (Vallaster et al., 2019; Martínez-López et al., 2018).

Results. *Figure 1 illustrates the advancement of scientific inquiry about potential impediments and challenges to female entrepreneurship over the years. This study topic has mostly evolved in recent years, with a notable surge since 2019 (n = 10) and attaining its apex of publications in 2024 (n = 26), with 2025 still underway. This increase may indicate a shift in attention towards scientific study and a persistent, expanding evolution of research in the domain of female entrepreneurship as a legitimate trend.*

To delineate the "research front" (Price, 1965) regarding barriers to female entrepreneurship through temporal overlap, we additionally employed an analysis of term co-occurrence (with a minimum of three occurrences). This is a dynamic analysis influenced by alterations in the research domain and the significance of a particular research line over time. The identification of the research frontier assists scholars in delineating the most contemporary tendencies in literature (Boyack and Klavans, 2010).

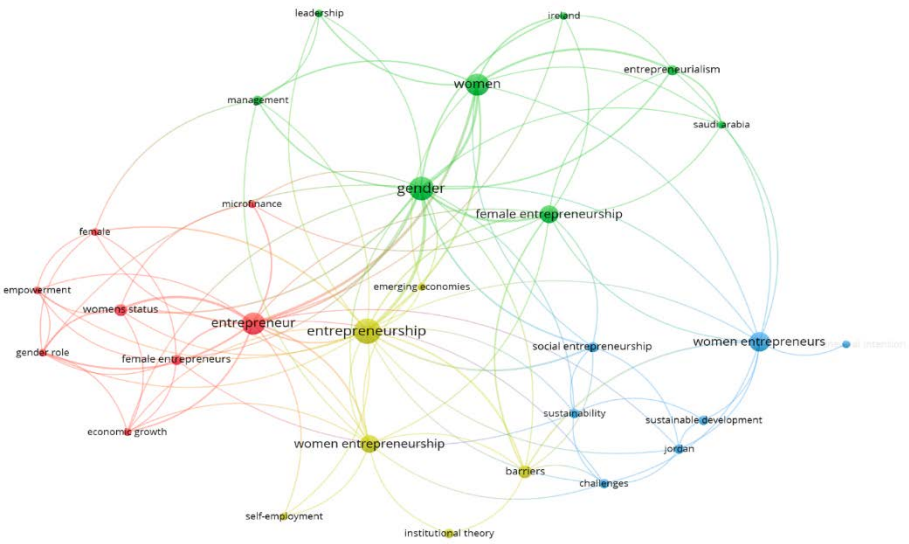
Fig. 1: Distribution of papers on annual basis



Keyword co-occurrences map (Fig. 2) offer a visual representation of the thematic landscape and progression of research on female entrepreneurship and associated concepts. Each node identifies a keyword that has emerged in the considered literature with more than three occurrences, with the node size generally indicating its frequency. The lines represent co-occurrence relationships: the greater the thickness or quantity of connections, the more frequently those keywords co-occur.

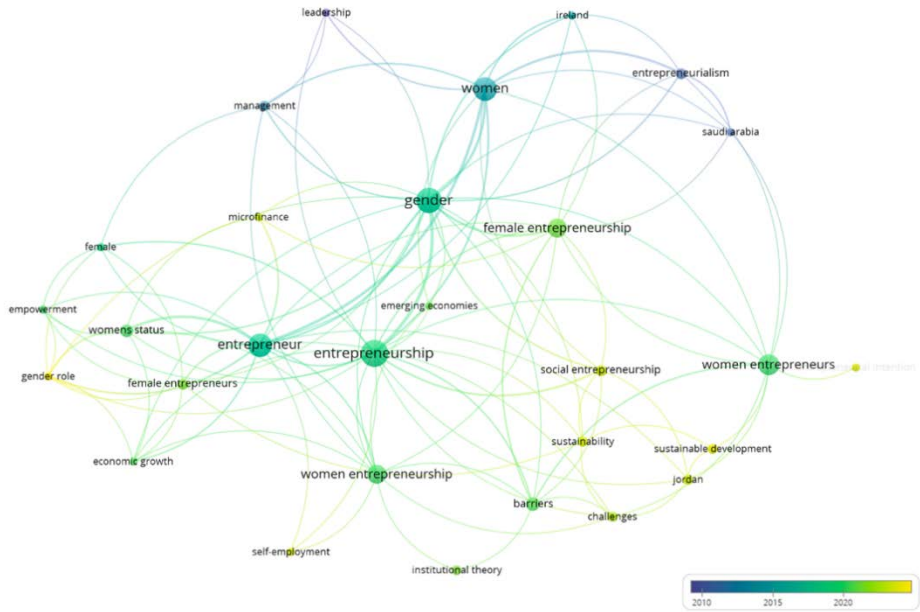
Specifically, red cluster focuses on "entrepreneur" and encompasses terms like "female entrepreneurs", "empowerment", "women's status", "empowerment", "economic growth" and "microfinance", underscoring the socio-economic aspect of women's entrepreneurship and its connection to economic development. The green cluster concentrates on "gender" "female entrepreneurship", "management", "leadership", highlighting the impact of social norms, roles, and circumstances on women's engagement in entrepreneurial endeavors. The yellow cluster encompasses "entrepreneurship", "women entrepreneurship", "self-employment", "emerging economies", "barriers" and "institutional theory," indicating a focus on structural considerations and the obstacles faced by female-led companies in emerging nations. The blue cluster encompasses "social entrepreneurship", "sustainability", "challenges", "women entrepreneurs" and "sustainable development" illustrating an organizational and cross-cultural viewpoint, with a growing interest in the social and sustainable dimension of entrepreneurship.

Fig. 2: Keywords co-occurrences



The second keywords map (Fig. 3), color-coded by time, utilizes a gradient ranging from dark blue for earlier years to yellow/green for more recent years, illustrating the evolution of attention on various topics over time. Earlier keywords such as "leadership," "management," and "entrepreneurialism" indicate that initial study concentrated on the essential definitions and functions of leadership and management within entrepreneurial settings. Emerging topics, indicated in lighter green or yellow, encompass "sustainability," "sustainable development," "challenges," "institutional theory," "gender role", and "self-employment," reflecting an increasing interest in the relationship between female entrepreneurship and sustainability, re-evaluating theoretical foundations to identify solutions to contemporary challenges, and subsequently adopting this novel entrepreneurial perspective as a viable occupational choice for women through self-employment. The map clearly indicates that "women entrepreneurship" with "gender" are consistently central theme throughout the time frame, linking to concepts such as "social entrepreneurship" and "barriers", thereby illustrating that research on women's entrepreneurial activities encompasses both historical and contemporary studies, maintaining significant relevance.

Fig. 3: Keywords co-occurrences over time



Next two co-citation maps, featuring countries as nodes, depict the nations that are frequently referenced in conjunction within the academic literature on female entrepreneurship. In the first map (Fig. 4), the United Kingdom (796 citations) and the United States (1480 citations) appear as the most significant nodes, acting as crucial reference points and signifying their frequent co-citation with various other nations. Countries like as India (121), Saudi Arabia (236), Canada (131) and Italy (204) exhibit significant connections to the UK, indicating a concentration of research that

frequently cites work from or pertaining to those areas. Simultaneously, the United States maintains a distinct yet intersecting network of affiliations, particularly with Australia (444), China (136), South Africa (133), and several European countries, indicating that research referencing US-based studies frequently includes literature from these nations. The second map (Fig. 5) employs a color gradient, transitioning from dark blue in 2010 to bright yellow in more recent years, to illustrate the variation in the average publication year of citations across different countries. India and some Middle Eastern nations (e.g., Qatar, Bangladesh) are depicted in almost yellow tone, indicating a comparatively recent influx of referenced research, while countries illustrated in mid-green (e.g., the UK, US) represent a corpus of work extending from slightly earlier to mid-range years.

Fig. 4: Co-citation countries

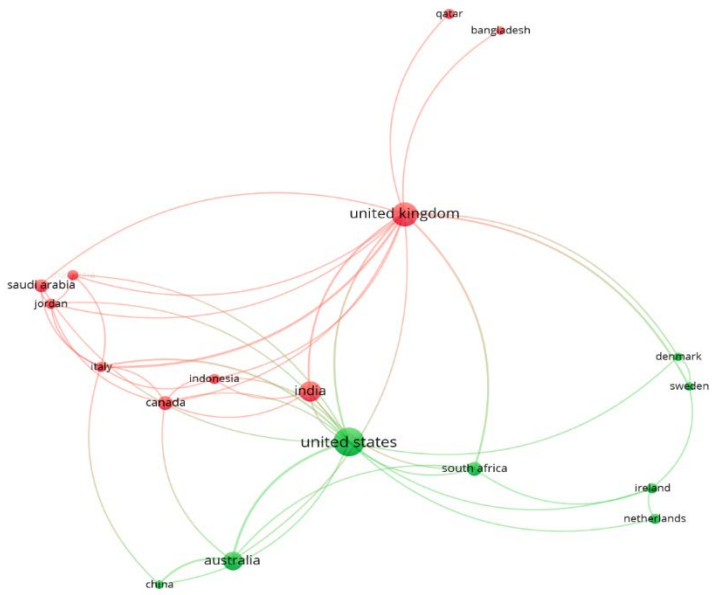
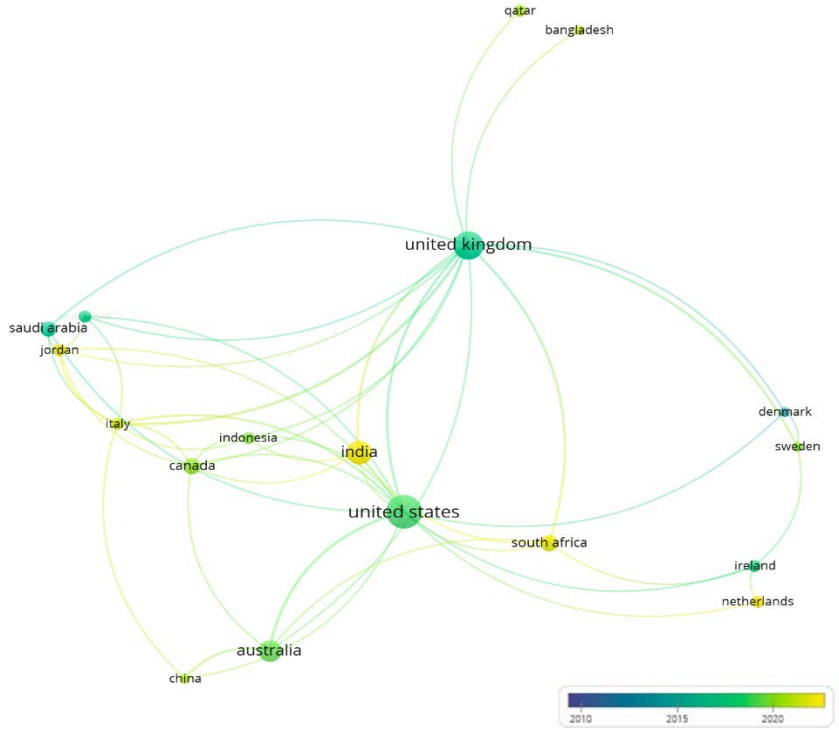


Fig. 5: Co-citation countries over time



Research limitations. *This study, despite offering new insights into the barriers to women entrepreneurship and on the theoretical perspectives applied to its analysis, encounters some limitations that need to be highlighted.*

Firstly, articles are limited to the analysis of certain geographical areas, but the barriers women face in entrepreneurship are often influenced by local cultural, economic, and institutional factors, meaning that findings from one geographical area may not be applicable to other regions. For example, while women in developed countries may face barriers related to access to capital or work-life balance, women in developing countries may face more challenges related to access to education and legal rights. Thus, research focusing on one area may not capture the broader, global landscape of women's entrepreneurial experiences. (Marlow et al. 2005).

For instance, the study of women's entrepreneurship in conservative cultures like those in the Middle East or North Africa may emphasize the role of patriarchal system and gender restrictions, whereas Western societies may have a different focus on issues like entrepreneurial ambition and work-life balance. This can lead to an overemphasis on specific barriers related to culture without considering how economic or political factors also affect women's entrepreneurship in these regions (Welter et al. 2011).

Secondly, the Institutional theory is the predominant theoretical lens to study the phenomenon, but often focuses on macro-level structures, such as legal systems, cultural norms, and market dynamics, but it pays less attention to micro-level factors, such as the personal motivations, psychological constraints, decision-making processes, and social networks that influence individual women entrepreneurs. Women's entrepreneurial behaviours can be influenced by factors like self-confidence, personal aspirations, and the availability of role models, which institutional theory may not adequately capture (McAdam et al. 2013).

Managerial implications. *This research can guide policymakers, managers and educational communities in addressing these challenges and empowering women entrepreneurs.*

Governments and organizations should create gender-sensitive policies that specifically address the unique barriers faced by women entrepreneurs. This includes initiatives aimed at improving women's access to capital, training, networks, and mentorship. Policies should also address gender biases and discriminatory laws that affect women (Marlow et al. 2005).

Managers in financial institutions and investors should be aware of gender biases in decision-making processes and actively seek to overcome them by ensuring gender diversity in investment teams, implementing bias training, and developing financial products tailored to women entrepreneurs (Brush et al. 2009).

Educational institutions and training providers should develop entrepreneurial programs that are not only accessible but also tailored to the specific needs of women entrepreneurs, providing support from both a skill-building and mentorship perspective (Ghosh, 2017).

Originality of the paper. *The aims of our literature review is to update researchers on the current state of knowledge and discoveries in the field for the synthesis and integration of findings from previous research. This is crucial to better understand the overall landscape of existing knowledge and establish connections between different studies. Through the analysis of existing literature, it is possible to identify knowledge gaps or areas where research is limited. This offers opportunities to contribute to such areas through new investigations.*

Specifically, the originality of our research lies on the exploration of new perspectives, examines under-researched contexts, and challenges existing theories; traditionally, studies of women entrepreneurship have centred on gender as the first variable, but new research emphasizes the importance of intersectionality: understanding how gender intersects with other factors such as race, class, ethnicity, age, and disability provides a new perspective to analyse the barriers to women entrepreneurship, highlighting how different women experience different challenges based on their diverse social identities.

Key words: *Women entrepreneurship, barriers, obstacles, inclusion, theory*

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The role of humane entrepreneurship for sustainability: Evidence from tourism digital start-ups

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Abstract

In the face of current complex environmental, social and economic challenges, this study aims to provide comprehensive empirical evidence about the influences of external and internal factors on the three dimensions of Humane Entrepreneurship and the inderdependences between them. To do so, we explore Entrepreneurial Orientation, Sustainability Orientation, and Human Resource Orientation in 10 Italian start-ups in the tourism sector adopting a combination of digital technologies, offering new and sustainable solutions. Preliminary results identify courage and collaborative networks as main factors influencing the strategic posture of human-centered investigated start-ups, with effects on sustainability. We propose an investigation of Humane Entrepreneurship in the tourism sector, widely acknowledged as a factor of sustainable development. Moreover, we focus on early entrepreneurship, still scarcely analysed in Humane Entrepreneurship in general, and in tourism in particular. We thus provide useful insights on how to incorporate not only Entrepreneurial Orientation, but also Sustainability Orientation, and Human Resource Orientation within digital start-ups entering the tourism sector.

Framing of the research. *Entrepreneurship has been attracting growing attention in theory and practice as a solution for the ever growing environmental and social problems, rather than their possible root cause, by creating momentum for innovation (Schaltegger and Wagner, 2011; George et al., 2021). It is significant that the UN General Assembly (2022) recognizes the crucial role played by entrepreneurs and firms in achieving all 17 sustainable development goals (SDGs). Not surprisingly, the UN Tourism (2020) promotes start-ups in tourism. It is exceedingly relevant given that at less than a decade until 2030, 48% of the SDG targets are off track, with 37% showing no improvement or even falling below the 2015 baseline (UN, 2023).*

Considering these challenges, the relationship between entrepreneurship and sustainability has gained significant attention over the past decade, giving rise to various research perspectives. In this context, many authors highlight the importance of balancing environmental, social, and economic goals (Hummels and Argyrou, 2021), a balance that is reflected in the concept of sustainability orientation. This strategic approach enables entrepreneurs to prioritize environmental protection, quality of life, and community well-being in their business activities (Elkington, 1997; Caselli, 2007; Baiocco and Paniccia, 2023).

Such a proactive stance is shaped by individual factors, such as education, values, and moral courage (Barnard, 1938; Paniccia et al., 2020; Paniccia and Baiocco, 2021), which allow entrepreneurs to navigate complex stakeholder relationships and reconcile contradictions (Donaldson and Preston, 1995; Paniccia, 2015).

In connection to the above, Humane Entrepreneurship (HumEnt) has recently emerged as a theoretical framework (Bae et al., 2018; Kim et al., 2018; Parente et al., 2018) drawing on the idea that entrepreneurs should broaden their focus beyond profit margins to encompass the well-being of their employees, local communities, the environment, and society at large (White Book, 2016). This approach, outlined by the Business Roundtable (2019), calls for creating value for all stakeholders, not just shareholders.

On this basis, the HumEnt framework integrates the consolidated entrepreneurial orientation (EO) construct, with two emerging ones, namely aforesaid sustainability orientation (SO), and human resources orientation (HRO), identifying them as the three interconnected dimensions of HumEnt, closely linked with firms' performance and sustainable development. Although HumEnt has garnered increasing scholarly attention (Kim et al., 2021; Cucino et al., 2024; Dębicka et al., 2022), most studies have treated its three constructs separately, mainly focusing on EO and SO (Vesci et al., 2023), neglecting the interdependencies and reciprocal effects between them and their impact on firms and society (Parente et al., 2021). This gap limits the understanding of the processes behind human-centered firms.

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An in-depth analysis of the internal and external factors influencing Humane Entrepreneurship in start-ups is crucial. It can aid in integrating and managing the three dimensions within firms and extending their positive externalities. This holistic approach is recognized as a significant gap in research (Parente et al., 2018).

This analysis is particularly relevant for the tourism sector, which contributes 9.2% of global GDP and 9.6% of employment (WTTC, 2023), with major sustainability implications (Bramwell et al., 2017). While research on sustainable entrepreneurship in tourism is still emerging (Sørensen and Grindsted, 2021; Galbreath et al., 2023), some studies highlight the role of tourism firms in promoting sustainable tourism (Hjalager, 2010; Komppula, 2014; Paniccia and Baiocco, 2021), including digital start-ups (UN Tourism, 2020; Baiocco et al., 2024). The growing focus on humanistic tourism (Botterill, 1989; Della Lucia et al., 2021) aligns with the values of Humane Entrepreneurship, emphasizing the integration of economic, social, and environmental goals, with a focus on people's well-being.

A key challenge is the role of digital technologies in entrepreneurship, which offer new opportunities for start-ups but also raise concerns around employment, surveillance, and work quality (Melè, 2021).

Purpose of the paper. *Based on the above premises, the following research questions are posed:*

RQ1. Are the three dimensions of Humane Entrepreneurship (Entrepreneurship Orientation, Sustainability Orientation, Human Resource Orientation) simultaneously present in tourism digital start-ups?

RQ2. What are the main external and internal factors that influence the Humane Entrepreneurship Orientation of tourism digital start-ups?

RQ3. What is the reciprocal causation between the three dimensions of the Humane Entrepreneurship?

Methodology. *The research adopts qualitative multiple case studies (Yin, 2018) to explore HumEnt within its real-life context, focusing on the complexities of each case, including its history and the internal and external environments (Mayan, 2023). The case study approach is appropriate for examining the reciprocal relationships between the three dimensions of HumEnt and their effects on society, as it allows to explore in depth complex and evolving phenomena, providing empirical material useful for understanding the components of Humane Entrepreneurship (Yin, 1984; Eisenhardt, 1989), and making the results more robust thanks to the comparison between multiple cases (Yin, 2018; Herriott and Firestone, 1983). Furthermore, this approach has already been successfully applied to analyze the ways in which companies adopt the HumEnt approach (Vesci et al. 2023).*

The unit of analysis is the digital start-up in Italy's tourism sector, chosen for three main reasons. First, tourism's role as a driver of sustainable development, addressing social and environmental issues, has been widely acknowledged (UN Tourism, 1998; Zolfani et al., 2015). Second, the ongoing smart transformation of the tourism sector, shaped by digital technologies like AI, brings significant benefits to stakeholders (Gretzel et al., 2015; Pencarelli, 2020), with start-ups playing a key role in socio-economic and environmental changes (Kézai et al., 2020; Monda et al., 2023; Baiocco et al., 2024). Third, Italy's tourism sector has consistently contributed more to GDP and employment than the global average, making it a fitting context for this study (WTTC, 2016-2023).

Purposeful sampling was used to guide the identification and selection of information-rich digital start-ups in the tourism sector (Patton, 2002). Criteria for inclusion comprised registration as innovative start-ups under Italy's "Start-up Act," adoption of advanced technologies like AI and cloud computing, and offering innovative services that address emerging needs such as sustainability and immersive experiences. As table 1 shows, ten case studies were identified from Start-up Turismo Association, which represents tourism start-ups in Italy, fosters collaboration, and promotes knowledge exchange among entrepreneurs and institutions.

Tab. 1: Overview of the selected digital start-up in the Italian tourism sector

#	Start-up's name and location	Year of establishment	N. of employees	Service offered	Value Chain	Technology
1	Traveleco S.r.l SB Monza, Lombardia	2021	7	Simulations to calculate the ecological footprint of hotels, contributing to environmental sustainability in the hospitality sector	Environmental consulting services for accommodation facilities	AI, Cloud computing, Big data
2	Sicilyland Palermo, Sicily	2022	2	Experience and Bike Tours in Sicily	Experiential tourism services	Cloud computing
3	Ruralis Sant'Angelo dei Lombardi, Avellino Campania	2022	16	Short-term rentals in Italian villages	Accommodation and promotion of rural tourism	Cloud computing, Big data
4	Lucus Viaggi digitali Milano, Lombardia	2022	18	Immersive and exciting walking tour, including connection in real time with local experts	Cultural and innovative tourism through immersive technologies	Augmented reality/Virtual reality, Immersive technologies
5	Aeffective srl Firenze, Tuscany	2019	7	Advanced sentiment analysis software that transforms opinions into value	Market analysis and management of the tourist experience	AI, Big data
6	Toratora Srl Rome, Lazio	2018	4	Innovative travel platform that organizes surprise trips all over Europe	Travel planning and personalization	AI
7	RedoMap Castelnuovo Bozzente, Como, Lombardia	2020	2	App that allows to create and manage interactive digital content such as maps, routes and geolocalized tourist information in different languages	Digital solutions for tourist orientation	Immersive technologies, Cloud computing
8	PemCards Cascina, Pisa, Tuscany	2017	7	Transforms photos taken by users into physical postcards, printed and posted anywhere in the world	Personalization and digital souvenirs	AI, Contactless technologies, Cloud computing
9	Elesta Milan, Lombardia	2014	3	Thematic tours created with the help of historians, archaeologists, architects, and experts from creative and artisan backgrounds	Thematic cultural tourism	Cloud computing
10	Manet Rome, Lazio	2015	7	Digital platform that allows accommodation facilities to increase the sale of services	Digitalization and optimization of hotel services	Cloud computing, AI, Contactless technologies

Primary data were collected through semi-structured interviews (Saunders et al., 2009) with entrepreneurs from February to March 2024. Interviews were transcribed verbatim and analyzed through qualitative content analysis. To enhance validity, findings were triangulated with additional sources such as reports, websites, and relevant publications.

Aligned with the HumEnt framework (Botti & Parente, 2024), the interviews explored: 1) the effects of HumEnt's three dimensions in business contexts, 2) factors favoring/hindering EO, SO, and HRO in start-ups, and 3) the interdependencies between the three dimensions.

n our analysis of EO, we examined its three main dimensions (innovativeness, proactiveness, and risk-taking) that define start-ups' entrepreneurial behaviors in introducing and managing new business opportunities (Miller, 1983, 2011; Covin & Slevin, 1989). For SO, we examined entrepreneurs' definition of sustainability to understand whether they perceive sustainability exclusively from an environmental perspective, the adoption of sustainable practices, and social sustainability to explore their engagement with social well-being (Elkington, 1997; Roxas & Coetzer, 2012). Finally, for HRO, we focused on the four key dimensions of HRM (empathy, equity, enablement, and empowerment), as identified by Kim et al. (2018), to assess how start-ups shape employee relationships to achieve individual, organizational, and societal goals.

Results. *In line with the theoretical background, both the drafting and analysis of the interviews were conducted according to the key concepts of HumEnt. All three dimensions of HumEnt were investigated, as detailed below.*

Entrepreneurial Orientation (EO)

Innovativeness - Interviewees emphasized innovation as essential for their start-ups, leveraging digital technologies to introduce new services and business models, such as AI-powered booking systems and sharing economy platforms. Innovation was seen as fundamental to market differentiation and resource optimization. ST1 highlighted its role in attracting tourists, while ST7 stated: "At the core of our company lies innovation." However, ST10 cautioned about the risks of fast-evolving technology, noting both opportunities and challenges. Many start-ups invest in R&D, collaborating with universities to develop cutting-edge solutions and enhance entrepreneurial capabilities.

Proactiveness - Start-up founders showed varied approaches to market positioning. Some balanced competitive benchmarking with original ideas, as ST5 stated: "We try to copy from the best but also anticipate unexpressed market needs." Others focused entirely on differentiation, like ST1: "We aim to be ahead, as our mission is to stand out." Some adopted coopetition strategies, blending collaboration and competition to strengthen market positioning.

Risk-Taking - Most start-ups adopted a proactive yet calculated approach to risk. While initially aggressive, many later transitioned to more structured strategies. ST6 noted: "At first, we took bold steps; now, we have a more stable approach." Investments prioritized technology, while ST3 uniquely emphasized hiring to scale operations. Networks such as Startup Turismo played a key role in mitigating risks by providing access to clients, investors, and expertise. ST8 acknowledged: "The Association helped us find partners and grow."

Table 2 summarizes the dimensions of EO, which are derived from the existing literature, and the related practices, emerging from the analysis of the case studies.

Tab. 2. Dimensions and practices supporting EO of the selected tourism digital start-ups

Dimensions	***References***	***Practices***
Innovativeness	*Covin e Slevin, 1989; Lumpkin and Dess, 1996*	– *Adoption of new digital technologies* – *Introduction of new services into both new and established markets* – *Adoption of new business models* – *Investment in R&D and qualified human resources devoted to new services and processes development* – *Collaborations with universities and Public Research Institutions* – *Financial resources devoted to technological innovation*
Proactivity	*Miller, 1983*	– *Alignment of the strategic "what to do" and the operational "how to do it" based on temporal perspective oriented to the future* – *Introduction of new services compliant with the evolving tourism industry as well as timely implementation (first-to-market)* – *Not imitation of competitors* – *Coopetition*
Risk taking	*Miller, 1983; Lumpkin and Dess, 1996*	– *Belonging to a collaborative network* – *Launching the start-up despite the threat of loss* – *Solving problems to securing the necessary resources to start the business*

Sustainability orientation (SO)

Definition of Sustainability - The interviewees highlighted a broad vision of sustainability that goes beyond the environmental aspect to include social and economic dimensions. ST2 states: "Sustainability is everything that has a low impact, all-round: energy, environmental, and human." One of the analyzed start-ups is a B-Corporation, legally required to consider the impact of its decisions on society, the environment, and employees. ST1 states: "We help accommodation firms reduce their impact, especially the environmental one."

Environmental Sustainability - The interviewed start-ups adopt various practices to address environmental challenges, including bike tours, water-saving consulting, promotion of local products, and the use of renewable energy.

While none have ISO certifications, many operate entirely digitally, reducing the need for physical offices and promoting remote work. A notable example is ST8, which collaborates with an association to offset paper use. The interviewee explains: "We use FSC-certified paper and plant a tree for every 1,000 postcards to offset our impact."

Social Sustainability - The analyzed start-ups leverage digital technologies to improve the quality of life for tourists and industry operators, facilitating interactions with local communities and enhancing destination value. ST6 states: "Our goal is to democratize travel, making it accessible to everyone." Some start-ups develop customized maps and storytelling tools to involve local communities, while others analyze tourist opinions to support decision-making by businesses and institutions. However, some interviewees report challenges in the effective use of technology by tourists and organizations in the sector.

Table 3 summarizes the dimensions of SO, which are derived from the existing literature, and the related practices, emerging from the analysis of the case studies.

Tab. 3: Dimensions and practices supporting SO of the selected tourism digital start-ups

Dimensions	***References***	***Practices***
Definition of Sustainability	*Elkington, 1997; Shepherd and Patzelt 2011*	— *Promotion of environmental sustainability* — *Promotion of social sustainability* — *Promotion of economic sustainability*
Environmental sustainability	*Roxas and Coetzer, 2012*	— *Use of digital technologies to offer services with low environmental impact (e.g. bike tour)* — *Operating remotely without fixed offices* — *Integration of green practices into business processes (e.g., waste offsetting)* — *Collaborations with associations to develop environmental compensation practices (e.g. planting trees in collaboration with external entities to compensate for emissions related to production and logistics)*
Social sustainability	*Caselli, 2007; Paniccia and Baiocco, 2021*	— *Leveraging new digital technologies to propose innovative and intelligent solutions enhancing quality of life for managers, tourists, local communities* — *Using networks to engage local communities in the development of tourism services, such as storytelling or personalized itineraries, promoting community well-being*

Human Resource Orientation (HRO)

Empathy - Start-up founders emphasized fostering a relaxed and positive work environment, promoting open interactions and collaboration. Being mostly young entrepreneurs with small teams, they prioritize employee freedom and team-building activities, from shared lunches to off-site weekends. ST2 states: "I need a workplace where everything is relaxed. We share, joke, and enjoy working." Most interviewees also highlight the importance of transparent communication, supported by digital tools that facilitate information sharing.

Equity - Interviewees largely agreed that fairness prevails in their start-ups, with hiring based on skills rather than gender, age, or nationality. ST3 explains: "The best idea always wins. We aim for a diverse, inclusive, and LGBTQ+ friendly environment." However, ST7 notes that for public-facing roles, appearance may play a role, stating: "It's an objective evaluation based on job requirements."

Enablement - Founders recognize training as crucial, with many already offering employee development programs and others planning to introduce them. ST8 states: "You must stay updated and train continuously." Some start-ups encourage employees to explore new technologies to enhance efficiency and job performance. Only one, ST1, does not provide structured training, leaving learning to employees' initiative.

Empowerment - Delegation and autonomy are widely encouraged, though some founders maintain oversight. Many believe empowering employees fosters job satisfaction and productivity. ST2 states: "Delegation means allowing people to enjoy their job and do it well. If they know their work, I'm not needed."

Table 4 summarizes the dimensions related of HRO, which are derived from the existing literature, and the related practices, emerging from the analysis of the case studies.

Tab. 4. Dimensions and practices supporting HRO of the selected tourism digital start-ups

Dimensions	***References***	***Practices***
Empathy	*Kim et al., 2018*	— *Sharing information that affects start-ups operations with employees* — *Alignment of start-ups with employees' wishes and opinions by engaging in team-building rituals (e.g. shared lunches and planned off-site weekends)*
Equity	*Kim et al., 2018*	— *Hiring prictices emphasizing equity* — *Absence of discrimination for employees of any status* — *Objective and clear criteria for evaluation and promotion*
Enablement	*Kim et al., 2018*	— *Access to advanced employee training courses through collaborative networks, ensuring continuous updates on technical and managerial skills* — *Continuous improvement of practices and systems to enable employees to do their best*
Empowerment	*Kim et al., 2018; Arnold et al. 2000*	— *Freedom for employees to make decisions on tasks for which they have relevant responsibility and power* — *Autonomy to employees in terms of work method used, commitment, speed, and time* — *Exhorting employees to voluntarily suggest good ideas for better work*

Preliminary results confirm the presence of HumEnt's three dimensions in the investigated start-ups, highlighting the influence of internal and external factors and their interdependencies.

Externally, factors such as regulation, social pressure, and collaborative networks (Meek et al., 2010; Dai et al., 2015) support sustainability, resource management, and local engagement. Particularly, collaborative networks (Sorenson et al., 2008) facilitate knowledge exchange and strategic development. Universities play a key role by providing skilled personnel, fostering innovation, and offering entrepreneurial training based on frameworks like EntreComp and GreenComp.

Internally, corporate culture, flexible structures, and HR practices based on empathy, equity, and empowerment (Ostroff et al., 2003; Kim et al., 2018) drive HumEnt adoption. Flexible models enable remote work, while continuous training enhances technical and managerial skills.

Individual factors, particularly entrepreneurial values (Jahanshahi et al., 2017; Paniccia & Baiocco, 2021), strongly influence strategic decisions. Among these values, entrepreneurs' courage links EO, SO, and HRO, balancing financial and social responsibilities. The proactive approach of entrepreneurs, leveraging AI and digital tech, enables innovative services that engage both tourists and local communities.

The interaction of external and internal factors is key to promoting HumEnt in tourism start-ups. For instance, a sustainability-driven culture enhances regulatory incentives and network collaborations, generating broad positive impacts. Table 5 outlines these interactions and the reciprocal causation between EO, SO, and HRO.

Tab. 5: Interaction between External, Internal and Individual Factors and Reciprocal Causation in Humane Entrepreneurship

External Factors	***Internal Factor***		***Reciprocal Causation***
	Firm-specific	***Individual-specific***	
Favorable regulatory context	*Corporate culture oriented towards sustainability*	*Entrepreneur and employees' core values and courage*	*SO and EO interact: incentives and regulations encourage entrepreneurs and employees' attentive to environmental and cultural values to adopt low-impact technologies for lamentinging new sustainable practices (e.g., remote work).*
Social pressure	*HR practices based on empathy and equity*	*Empathy and focus on human relationships*	*EO and HRO mutually strengthen each other: ethical hiring practices and equity foster employee trust, which in turn enables collaboration and commitment to developing innovative and intelligent solutions that enhance the quality of life for managers, tourists, and local communities*
Collaborative networks	*Flexible organizational structures*	*Learning ability, reflective capacity, and courage to navigate uncertainties and implement changes*	*SO and HRO are interconnected: Collaborations with universities, associations, institutions and other firms support training programs and integration of green practices into business processes (e.g. waste offsetting; planting trees in collaboration with external stakeholders to compensate for emissions related to production and logistics)*
Competitive context, demand for innovation, technological progress and policies	*Technological innovation*	*Openness to change and courage to innovate responsibility*	*EO fosters SO: Entrepreneurs invest in R&D and sustainable business models, balancing risk-taking with ethical foresight, while aligning the strategic "what to do" with the operational "how to do it" based on a future-oriented temporal perspective.*

Research limitations. *The limitations of the study are primarily related to its preliminary stage, which requires further exploration to fully understand the dynamics and implications of the proposed framework. The main limitations include the research methodology used, which does not allow for generalizing the results, the small number of interviews conducted, and the scope of the study, which is limited to the Italian context.*

Managerial implications. *Although, this study is still in its early stages, interesting theoretical and practical implications emerge from its preliminary results. It responds to the call for more empirical research in the field of HumEnt demonstrating the interconnections and reciprocal influences between the three dimensions. In doing so, it identifies the main factors that influence the strategic posture of human-centered firms, thus sustainability. Carefully considering these factors and acting upon them can help decision makers, but also policy makers, to manage and solve the possible contradictions inherent in the dialectical nature of the relationships between various stakeholders that hinders progress toward sustainability.*

Drawing on the key factors that emerged from the analysis, the following coordinated actions are suggested:

- *To offer incentives, such as tax credits and subsides, to start-ups that invest in low-impact technologies, promote remote work options, and are compliant with sustainability standards (such as emissions limits, waste reduction targets).*
- *To implement mechanisms to monitor compliance with sustainability standards and require start-ups to report on their initiatives*
- *To establish certifications or awards for start-ups that demonstrate a commitment to socioeconomic and environmental values through their operations and activities.*

- *To design human resources practices that actively seek candidates with entrepreneurial mindsets (e.g., proactiveness, risk-taking, innovation) while ensuring inclusivity and fairness in selection.*
- *To co-design training programs with external stakeholders (including universities, civil society organizations) promoting a culture where risk-taking is guided by responsibility toward future generations and ecosystem integrity;*
- *To support initiatives where employees collaborate across departments and with external stakeholders (e.g., local communities, tourists, NGOs) to co-develop solutions that are both innovative and socially responsible.*
- *To organize workshops and learning events involving start-ups, firms, institutions, universities, and communities to share best practices, raise awareness, and co-design initiatives that embed green thinking into both strategy and human resources development.*

By combining these actions, decision-makers and policy-makers can create a supportive ecosystem for start-ups that aim to cultivate a purpose-driven organizational culture, align their mission with societal well-being and sustainability goals, and ensure that employees see their entrepreneurial efforts as contributing to a broader human and community-oriented purpose.

Originality of the paper. *To the best of the authors' knowledge, this is the first study to explore the interdependencies and reciprocal causation between EO, SO, and HRO within HumEnt. By identifying practices linked to these orientations, it makes the application of HumEnt to businesses more tangible.*

We explore Humane Entrepreneurship in the tourism sector, a key driver of sustainable development, focusing on early-stage entrepreneurship, which has been underexplored in both HumEnt and tourism. This research offers insights into integrating EO, SO, and HRO within digital start-ups in tourism.

Finally, this study sheds light on the importance of advancing HumEnt research by adopting holistic perspectives, particularly to better understand interdependencies, influences and reciprocal causation between EO, SO, and HRO and among HumEnt firms and the wider society. In this regard, the co-evolutionary perspective to the study of the relationships between firms and their environment (e.g. Abatecola 2020) seems particularly useful. In fact, co-evolution conceives the firm-environment relationships as circular, with mutual influence, and dialectical.

Keywords: *Humane Entrepreneurship; Innovation, Sustainability; Courage; Tourism digital start-ups; Multiple case studies*

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Rethinking Entrepreneurial Mindsets: Concepts and Measuring of Individual Humane Entrepreneurial Orientation

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Abstract

The increasing relevance of Humane Entrepreneurship calls for a deeper understanding of how its principles manifest at the individual level. While prior research has largely focused on firms, little attention has been given to the entrepreneurial mindset of individuals who embrace a Humane Entrepreneurial Orientation (HEO) in their approach to business. This study addresses this gap by proposing and empirically testing a novel measurement scale: the Individual Humane Entrepreneurial Orientation (IHEO). Through a scale development process-including item generation, factor analysis, and reliability assessments-this study establishes IHEO as a robust construct capturing the extent to which individuals integrate entrepreneurial, sustainability, and human-centric personal characteristics into their overall personal orientation. The validation is conducted on a sample of university students engaged in entrepreneurship education programs, providing initial evidence of the scale's psychometric properties and conceptual relevance. The results indicate that the proposed items exhibit an excellent fit with the constructs of Individual Entrepreneurial Orientation, Individual Sustainability Orientation, and Individual Human Orientation, reinforcing the validity of IHEO as a multidimensional measure. The findings offer significant implications for both research and practice. By providing a validated tool for assessing humane entrepreneurial orientation at the individual level, this study enables future investigations into its role in shaping entrepreneurial behavior. Moreover, educators and policymakers can leverage the IHEO scale to design programs that foster a new generation of entrepreneurs who embrace the Humane Entrepreneurial orientation-integrating environmental and social sustainability with a strong commitment to the well-being and development of human resources within their enterprises.

Framing of the research. *Today, issues such as resource overconsumption, environmental degradation, and social inequity are central to the agenda of international organizations, including the United Nations and its 2030 Agenda for Sustainable Development (United Nations, 2015). The business sector plays a crucial role in addressing these challenges, with entrepreneurial firms, in particular, having the potential to drive change through their strategic choices and behaviors. Many Micro, Small, & Medium Enterprises (MSMEs) are now responding to these global concerns by adopting business models that balance profitability with commitments to wealth creation, quality job opportunities, and social and environmental sustainability.*

The intersection of entrepreneurship, sustainability, and human-centric management has become a fundamental area of research, leading to the emergence of the Humane Entrepreneurship (HumEnt) model. This framework has been extensively analyzed in the literature, with studies highlighting its epistemological foundations (Parente, ElTarabishy, Vesci, & Botti, 2018) and its potential to create decent jobs (Kim, ElTarabishy, & Bae, 2018). Empirical research, primarily based on qualitative case studies, has explored how HumEnt principles manifest within organizations and influence their strategic and operational dynamics (e.g., Vesci et al. 2023; Anggadwita et al. 2021), along with empirical investigations examining its impact on business performance (Le, 2022). HumEnt is designed to capture the multifaceted nature of 21st-century entrepreneurship, moving beyond financial performance metrics to incorporate considerations of human welfare, planetary well-being, and workforce empowerment (Elkington, 1997).

Kim et al. (2018) propose integrating entrepreneurship, leadership, and human resource management (HRM) to create wealth and quality employment. They identify employee engagement as a critical component of organizational improvement and define Humane Entrepreneurship Orientation (HEO) through four dimensions: empathy, equity, enablement, and empowerment. Parente et al. (2018) extend this framework by incorporating social and environmental

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sustainability, building on the triple bottom line (TBL) model (Elkington, 1994). Their approach suggests that HEO at the firm level can be conceptualized as the combination of Entrepreneurial Orientation (Covin & Slevin, 1989) with Sustainability Orientation and Humane Resource Orientation (Parente et al., 2018, 2020; Vesci et al., 2024b).

A key aspect of the HumEnt model is its foundation in organizational culture and the personal values of both entrepreneurs and employees (Vesci et al., 2023; Parente et al., 2018). This perspective aligns with the idea that entrepreneurship is not merely an economic activity but also a reflection of personal philosophies and ethical commitments (Vesci et al., 2022; Parente et al., 2021). While previous studies have primarily examined HEO at the firm level, less attention has been given to how these characteristics manifest at the individual level. For example, for some years EO (which is the basic component of a humane entrepreneurial strategic posture) has been considered as a firm-level construct that helped to characterize a firm (Chandrakumara et al., 2011; Grande et al., 2011; Gupta and Gupta, 2015; Hafeez et al., 2011). However, recent studies have recommended that it should also be considered as an individual-level construct (Robinson and Stubberud, 2014). Such recommendations have paved the way for researchers to explore EO from a new perspective (Koe, 2016). Taatila and Down (2012) suggest that, to assess students' drive and competencies for a successful entrepreneurial career, a practical understanding of their EO is essential.

Individual Entrepreneurial Orientation (IEO)

Entrepreneurial orientation (EO) is a concept originated from Miller (1983) which consists of three dimensions, namely innovativeness, pro-activeness and risk-taking. It was then further popularized by Covin and Slevin (1989) in their concept of entrepreneurial strategic posture (ESP). In later years, Lumpkin and Dess (1996) further refined EO and they suggested a five-dimension model which includes autonomy, innovativeness, risk-taking, pro-activeness and competitive aggressiveness. Throughout the years, EO has been widely recognized by researchers as a firm-level construct that determines a firm's performance (e.g.: Grande et al. 2011; Hafeez et al. 2011; Chandrakumara et al. 2011; Gupta and Gupta, 2015). For instance, by using a five-dimension EO model, Koe (2013) found that innovativeness, proactiveness, risk-taking, competitive aggressiveness and autonomy positively influenced the firms' performance. In addition, Dada and Watson (2013) regarded EO as a holistic construct and confirmed that it positively related to financial and non-financial performance. Nevertheless, in recent years, researchers have suggested that EO can also be regarded as an individual-level construct (Robinson and Stubberud, 2014). Such suggestion has given new rooms to researchers to investigate EO from a new level and perspective. Extant studies which examined individual entrepreneurial orientation (IEO) agreed that IEO is a multi-dimension construct and it consists of elements similar to firm-level EO. For examples, Chien (2014) found IEO to be positively related to business performance. A relationship between IEO and business success was also proven by Bolton (2012). The above studies have indeed given some new insights on IEO as an individual-level of EO. However, most of them are focusing on IEO-performance relationship. Moreover, since IEO is considered relatively new, researchers need to pay attention to the operationalization of its elements in their studies.

IEO can be defined as the capacity for, competence and willingness or drive of an individual to become an entrepreneur (Taatila and Down, 2012). As a recently developed concept, IEO also required measurement instruments and scales (Frunzaru and Cismaru, 2021). Lumpkin and Dess (1996) provided the starting point with their five dimensions of EO and subsequently Bolton and Lane (2012) developed a scale consisting of three dimensions – innovativeness, risk-taking and proactiveness. IEO is considered an entrepreneurial competency that can be developed through experiential learning (Sahoo and Panda, 2019). Recent studies show a positive relationship between IEO and EI (Ekpe and Mat, 2012; Martins and Perez, 2020; Robinson and Stubberud, 2014; Zhang and Bruning, 2011). Ibrahim and Lucky (2014), for example, studying Nigerian students at the University of Malaysia, found a positive and significant relationship between IEO and EI. Hassan et al. (2021) found direct and indirect roles of individual entrepreneurial orientation and entrepreneurship education in determining students' entrepreneurial intention through the mediation of entrepreneurial motivations. Literature is available on EO as a firm-level construct, with many studies having been conducted on its relationship to business performance, but because IEO is a more recent conceptualization, there is comparatively little literature on the construct (Martins and Perez, 2020; Hassan et al. 2021). IEO captures the extent to which nascent entrepreneurs are innovative, proactive, and risktakers in the process of starting their entrepreneurial activity. Generally, new ventures displaying higher entrepreneurial orientation have greater potential in terms of business performance (Rauch et al., 2009). Hence it is important to assess the extent to which aspiring or nascent entrepreneurs actively engage in innovation, are willing to take calculated risks, and maintain a forward-thinking approach to business development, as their entrepreneurial orientation could lead to the development of more successful businesses (Bolton and Lane, 2012; Clark et al., 2024).

Individual Sustainability Orientation (ISO)

Sustainability Orientation has been developed in the field of sustainable entrepreneurship, which remains an ambiguous area of research. As a consequence, the sustainability orientation domain is still vague. In fact, the current analysis has demonstrated that there is no agreement on the definition of SO, revealing that some authors focus on only environmental issues and others focus on both environmental and social issues. Moreover, if a large number of scholars retain SO as a firm-level conceptualization, there are influential studies that have proposed SO to be measured at the individual level (Parente et al. 2020). Additionally, it is not even clear if SO is a strategic posture, an attitude, or a motivation toward action, as scholars have adopted all these categorizations. Although the literature has proposed

numerous measurement scales of SO, the majority of them derive from the Kuckertz and Wagner scale (2010), which has been adapted over time to the attitudinal or behavioral SO conceptualization. Inasmuch as HEO is a strategic posture that is measured at the firm level, and it is both attitudinal and behavioral, the SO measurement scale has not been as well developed in the literature for the purpose of the HEO measurement. Parente et al. (2020) refer to SO as a firm-level strategic orientation demonstrated by the fact that firm behavior exhibits a high level of commitment to the preservation of the natural environment but also respects society-driven initiatives and acts: to (a) improve the health and well-being of people in the firm; (b) improve the quality of life in the local community; and (c) promote democratic business models. Accordingly, we refer to ISO as an individual-level orientation demonstrated by the fact that individual behavior exhibits a high level of commitment to the preservation of the natural environment but also respects society-driven initiatives and acts to improve the quality of life in the local community. In this sense, the starting point toward the generation of items to measure ISO as framed in IHEO seems to be the scale proposed by Muñoz and Dimov's (2015) proposal to take into account the entrepreneurs' attitudes and convictions with regard to sustainability. Since HumEnt conceives HEO as a strategic posture that is both attitudinal and behavioral, the proposed conceptualization and operationalization of ISO semantically cover both the two dimensions of environmental sustainability and social sustainability. These items are also able to capture both the attitudinal (orientation) and behavioral (actions) features that are encapsulated in the domain of SO as defined by HumEnt theorists.

***Individual Human Orientation (IHO): Definition and Measurement scale**s*

HRO is based on the assumption that respecting and engaging employees is a successful strategy to achieve organizational results (Parente et al. 2022). HRO as intended in the domain of HumEnt is a new construct: inasmuch as HRM an extensive topic, one way to assess HRO from a strategic posture perspective is to pay attention to humane resource practice in terms of the actions taken to strategically pursue given practices. Unfortunately, an accepted measurement scale of entrepreneur/top manager behavior fitting HRO as intended in the domain of HumEnt does not exist (Parente et al. 2020; Vesci et al. 2022). Moreover, no agreement can be found in the literature on the number and type of human resource policies and practices that populate HRM. Kim et al. (2018) proposed their idea of human resource policies and practices as being strictly linked with HumEnt, describing these policies and practices in light of the principles of humanistic management (Melè, 2016). Moving from the conceptualizations of Human Resources Orientation (HRO) proposed by Kim et al. (2018) and tested by Le (2022) that represent the ways in which HR Management is integrated within the authors' idea of HumEnt, we identify and define four main dimensions that should qualify IHO at individual level: (a) empathy as the extent to which an individual shares emotions and information with others; (b) equity as the extent to which an individual treats others in a fair and equal manner; (c) enablement as the extent to which an individual provide others individual what everything they needs to develop their (life) projects to the best of their abilities; and (d) empowerment as the extent to which an individual shares information and resources with another individual in developing a particular task offering him to participate in the decision-making process.

Purpose of the paper. *The purpose of this work is to develop and test a novel measurement scale-Individual Humane Entrepreneurial Orientation (IHEO)-to assess the extent to which individuals integrate entrepreneurial, sustainable, and human-centric values into their mindset and orientation. While the concept of Humane Entrepreneurship has gained traction in recent years, most studies have focused on the organizational level, leaving a critical gap in understanding how these principles manifest at the individual level. By proposing a psychometrically scale, this study aims to provide researchers with a reliable tool for measuring humane entrepreneurial orientation in individuals, enabling further exploration of its implications for entrepreneurial behavior and education. Additionally, this study seeks to contribute to practice by offering a framework that educators and policymakers can use to design programs fostering entrepreneurs who embrace the Humane Entrepreneurial Orientation-integrating environmental and social sustainability with a strong commitment to the well-being and development of human resources within their enterprises. This study investigates how the values and characteristics associated with the HumEnt approach are framed in student entrepreneurs, trying to answer the Research Question:*

***RQ**: How are the characteristics and values associated with a HumEnt approach framed in student entrepreneurs?*

Methodology. *To propose and test a measurement scale for Individual Humane Entrepreneurship Orientation, we conducted a quantitative study using Factor Analysis. Data were collected through a structured survey administered to a sample of university students engaged in entrepreneurship-related courses and activities. In line with the methodological recommendations of Churchill (1979) and Kline (2005), this study adopts multiple items on a seven-point Likert scale to measure all constructs, ensuring both reliability and validity in capturing their multidimensional nature. The survey included scales adapted from previous literature (Kim et al., 2018; Bolton & Lane, 2012; Munoz and Dimov, 2015; Le, 2022) to measure the three dimensions of IHEO:*

***Individual Entrepreneurial Orientation**: IEO captures the extent to which nascent entrepreneurs are innovative, proactive, and risktakers in the process of starting their entrepreneurial activity by means of the 10-item 7-point Likert scale by Bolton and Lane (2012).*

***Individual Sustainability Orientation**: Since HumEnt conceives HEO as a strategic posture that is both attitudinal and behavioral, the proposed ISO measurement scale has been derived from the two scales proposed by Muñoz and*

Dimov's (2015), namely the Sustainability Orientation scale (from which we adapted two attitudinal environmental and social ISO items) and the Sustainability-Oriented Entrepreneurial Actions scale (from which we adapted two behavioral social and environmental ISO items). More clearly, to measure Sustainability Orientation (SO), Muñoz and Dimov's (2015) asked about the entrepreneurs' attitudes and convictions about sustainability as reflected in their perceptions of the venture they were creating. They used a 6-item Likert scale (in turn adapted from Kuckertz and Wagner 2010, to reflect the fact that they were referring to a specific venture, rather than entrepreneurship in general). To measure Sustainability-oriented entrepreneurial actions, Muñoz and Dimov's (2015) focused on the extent to which the entrepreneurs aimed to solve sustainability problems in setting up immediate objectives in the course of developing their ventures. They use an 8-item Likert scale, the dimensions were derived from study of Dyllick and Hockerts (2002) to represent eight traditional sustainability objectives. Therefore, to assess ISO, we propose four items that semantically cover both the two dimensions of environmental sustainability (two items) and social sustainability (two items). These items are also able to capture both the attitudinal (orientation) and behavioral (actions) features that are encapsulated in the domain of SO as defined by HumEnt. Finally, we have also adapted the four selected items shifting the focus from the firm-level to the individual- level (in order to align the measure of Individual Sustainability Orientation with that of Individual Entrepreneurial Orientation).

***Individual Human Orientation**: In the original conceptualization proposed by Kim et al. (2018) HRO dimension is twofold. On the one hand, it is related to a manager's personal characteristics, on the other hand, it takes into account the point of view of the leader who, facing different challenges, understands the importance of implementing strategic HRM through HR practices. For this reason, the dimensions are intended as behaviorist constructs whose measurement is based on managers' and entrepreneurs' behaviors in terms of actions performed to realize each dimension. As a consequence, the Kim et al. (2018) measurement scale for empathy, equity, enablement, and empowerment refers to the firm level, which can be intended as the level of strategic posture conceptualize in the HumEnt domain. In order to align the conceptualization proposed by Kim et al. (2018) with an individual perspective of humane orientation, we selected one item on each dimension (empathy, equity, enablement and empowerment, for a total of 4 items) and adapted from the firm-level to an individual-level measurement, in order to align the measure of IHO to that of Individual Entrepreneurial Orientation (IEO).*

An exploratory factor analysis (EFA) was performed to identify the underlying structure of the IHEO construct at the individual level. The Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity were used to assess the suitability of the data for factor analysis. Principal Component Analysis (PCA) with varimax rotation was applied to extract and interpret the factors. Reliability and validity of the constructs were assessed through Cronbach's alpha and composite reliability (CR) indices.

Results. *The study was conducted on a sample of 223 university students from University of Salerno, recruited through classroom invitation. The sample consisted of 45,2% males and 54,8% females, with an average age of 23,1 years (SD = 2.06). Prior entrepreneurial experience was reported by 18,4% of respondents, while 60,5% had previously attended entrepreneurship-related courses.*

To assess the underlying structure of the proposed Individual Humane Entrepreneurship Orientation (IHEO) scale, an Exploratory Factor Analysis (EFA) was conducted using principal component factoring with varimax rotation, given the expected correlation between factors. For Individual Entrepreneurial Orientation (IEO), the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .938, demonstrating strong suitability for factor analysis. Bartlett's test of sphericity was highly significant (χ^2 = 1,989.209, $p < .000$), supporting the appropriateness of the factor model. The analysis of eigenvalues and the scree plot indicated a one-factor solution, accounting for 69.8% of the total variance. All items loaded cleanly onto this factor, with no factor loadings below 0.40 or problematic cross-loadings above 0.30, resulting in a well-defined unidimensional structure. For Sustainability Orientation (SO), the KMO value of .822 confirmed the adequacy of the sample for factor analysis. Bartlett's test of sphericity yielded a significant result (χ^2 = 968.191, $p < .001$), reinforcing the validity of the factor model. The exploratory factor analysis revealed a single-factor structure, explaining 87.2% of the total variance. No issues with factor loadings were detected, as all items exhibited strong loadings above 0.40 with minimal cross-loadings, leading to a final one-dimensional construct. Finally, regarding Individual Humane Orientation (IHO), the KMO statistic was .856, further indicating that the dataset was well-suited for factor analysis. Bartlett's test of sphericity was significant (χ^2 = 806.388, $p < .001$), confirming the factorability of the correlation matrix. The eigenvalue distribution and scree plot suggested a single-factor solution, capturing 84.6% of the total variance. The analysis confirmed that all items loaded adequately onto the factor without cross-loading concerns, resulting in a cohesive and interpretable unidimensional structure.

The internal consistency of the scale was evaluated through Cronbach's alpha (α) and Composite Reliability (CR). All subscales demonstrated satisfactory reliability, with α values ranging from .938 to .952 and CR values above the recommended threshold of 0.70. Convergent validity was assessed via Average Variance Extracted (AVE), with all factors exceeding the minimum threshold of 0.50. Discriminant validity was confirmed using the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio, both indicating that each factor was empirically distinct. The final IHEO scale comprises 3 factors and 18 items, demonstrating strong psychometric properties. This validated measurement tool provides a reliable foundation for future research on humane entrepreneurship at the individual level.

Research limitations. *Despite its contributions, this study has some limitations to be acknowledged. First, the research is based on a sample of students, which, while relevant for investigating Individual Humane Entrepreneurship*

Orientation (IHEO), may limit the generalizability of the findings to other samples. Future studies could extend this research by examining IHEO in established entrepreneurs or across different entrepreneurial ecosystems to assess its applicability beyond the student population. Second, the study relies on self-reported data, which may introduce social desirability bias. Respondents might have overestimated or underestimated their orientation toward humane entrepreneurship due to personal or social expectations. Future research could integrate behavioral data or longitudinal studies to validate whether self-perceptions translate into actual entrepreneurial behaviors. Third, the study primarily captures IHEO at a single point in time, making it difficult to assess how these orientations evolve over time. A longitudinal approach could provide deeper insights into how students' entrepreneurial, sustainability, and human orientations develop as they transition from education to real-world business experiences. Finally, the study may be contextually constrained, as institutional, cultural, and economic factors could influence the relevance and impact of IHEO differently across regions. Future research should explore cross-cultural comparisons or test the robustness of the IHEO framework in different countries and educational environments.

Managerial implications. *The findings of this study hold significant implications for entrepreneurship educators, policymakers, and practitioners aiming to foster a new generation of responsible entrepreneurs. First, by identifying the key dimensions of Individual Humane Entrepreneurship Orientation (IHEO)-individual entrepreneurial orientation, individual sustainability orientation, and individual human orientation-this research underscores the importance of cultivating not only business acumen but also ethical and sustainability-driven mindsets in aspiring entrepreneurs. Educational institutions play a critical role in this process, as they can leverage these insights to design curricula that go beyond traditional business training. Programs should integrate experiential learning, mentoring, and exposure to real-world entrepreneurial challenges, ensuring that students develop both the cognitive and affective skills necessary to lead businesses with a balance of profitability and social responsibility. Business schools and incubators should emphasize social impact projects, interdisciplinary collaboration, and ethical decision-making frameworks, equipping students with the tools to navigate complex business environments while maintaining a strong commitment to sustainability and humane values. For policymakers, the study suggests the need to develop targeted policies and incentive structures that encourage humane and sustainable entrepreneurship at the individual level. Governments and institutions should invest in training programs, funding opportunities, and tailored mentorship initiatives for young entrepreneurs who exhibit strong IHEO characteristics. This could include grants for startups with a social or environmental mission, tax incentives for businesses founded by student entrepreneurs committed to sustainable practices, and partnerships between universities and industry leaders to facilitate knowledge transfer and support structures. Additionally, integrating IHEO-based assessment tools into government-funded entrepreneurial programs could help in identifying and nurturing high-potential individuals who align with the principles of humane entrepreneurship. By fostering a culture of entrepreneurial responsibility, both academia and policymakers can contribute to the development of an innovation ecosystem where businesses are not only profit-driven but also agents of positive social change.*

Originality of the paper. *This study contributes to the entrepreneurship literature by extending the Humane Entrepreneurial Orientation (HEO) construct to the individual level, introducing the concept of Individual Humane Entrepreneurship Orientation (IHEO). While previous research has extensively examined HEO at the firm level, there has been limited exploration of how these principles manifest in individual entrepreneurs, particularly students. By integrating Individual Entrepreneurial Orientation (IEO), Individual Sustainability Orientation (ISO), and Individual Human Orientation (IHO), this paper proposes and empirically tests a novel multidimensional measurement scale for IHEO, filling a critical gap in the literature. Furthermore, the study provides new theoretical and methodological insights by adapting validated firm-level constructs (e.g., Kim et al., 2018; Muñoz & Dimov, 2015; Bolton & Lane, 2012) to an individual-level framework. This approach aligns with recent calls in the literature to explore entrepreneurial orientation and sustainability orientation as individual-level constructs (Robinson & Stubberud, 2014; Koe, 2016), particularly in the context of student entrepreneurs. By focusing on the early-stage adoption of HumEnt principles, this research offers practical implications for entrepreneurship education and policy-making, highlighting how fostering sustainability, empathy, equity, enablement, and empowerment among students can shape the next generation of "humane" entrepreneurs.*

Key words: *Individual Humane Orientation; Humane Entrepreneurship; Student Entrepreneurship; Scale Development*

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Urban Innovation, Housing Costs, and Youth Entrepreneurship: Rethinking the Smart City Model

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Abstract

The increasing digital transformation of cities has placed smart urban ecosystems at the center of economic and policy discussions. While smart city advancements are often seen as catalysts for innovation and entrepreneurship, their socio-economic implications remain underexplored. This study examines the dual role of urban innovation in shaping youth entrepreneurship, considering both its enabling effects and potential constraints. While technological progress and digital infrastructures can lower barriers to entry and create new market opportunities, rising housing costs and affordability issues in technologically advanced cities may counterbalance these benefits, restricting access to urban entrepreneurial ecosystems. By applying a Push and Pull framework, this research investigates how urban innovation fosters youth entrepreneurship and whether escalating living costs moderate this relationship. Using a longitudinal dataset covering 38 Italian cities from 2009 to 2022 and employing Generalized Method of Moments (GMM) estimation, the study explores the non-linear effects of urban innovation on youth-led business creation. Preliminary results suggest that while urban innovation initially stimulates entrepreneurial activity, its benefits diminish as housing costs increase, leading to a potential inverted U-shaped relationship. This finding challenges the assumption that smart city development inherently fosters inclusive entrepreneurship and highlights the need for policies that balance technological progress with economic accessibility. By shedding light on the trade-offs between innovation and affordability, this research contributes to the broader discourse on entrepreneurial ecosystems in digitally transforming cities, offering critical implications for urban policymakers and stakeholders.

Framing of the research. *The ongoing digital transformation of urban environments has pushed the smart city paradigm to the forefront of contemporary urban and economic research. Cities are increasingly integrating digital infrastructures, big data analytics, and artificial intelligence to enhance urban management, optimize resource allocation, and improve citizen engagement (Caragliu et al., 2011; Guo & Zhong, 2022; Kummitha, 2024). These technological advancements are often framed as universal enablers of economic and social progress, leading to assumptions that digital transformation in cities fosters innovation, entrepreneurial opportunities, and economic inclusivity (Albino et al., 2015; Christofi et al., 2021; Dameri et al., 2019). However, while much of the smart city literature emphasizes efficiency, sustainability, and technological advancements, there is a growing need to understand the socio-economic consequences of these transformations (Datta, 2015; Hollands, 2015; Marchesani et al., 2025).*

A crucial yet underexplored dimension in this debate is the intersection between urban innovation, youth entrepreneurship, and socio-economic barriers. Youth entrepreneurship is widely recognized as a driver of innovation and economic dynamism, particularly in rapidly evolving urban settings (D. Audretsch et al., 2020; Ogamba, 2019). Young entrepreneurs introduce fresh perspectives, foster community engagement, and contribute to urban economic resilience, making them key actors in smart city transitions (Marchesani et al., 2022). However, as cities become more digitally advanced, rising living costs and housing affordability have emerged as significant barriers that shape entrepreneurial opportunities and behaviors (Essafi Zouari et al., 2021; Florida, 2002; Manitiu & Pedrini, 2016). The increasing costs of urban life, especially in digitally mature cities, risk excluding younger and less financially stable entrepreneurs from urban entrepreneurial ecosystems, ultimately challenging the inclusivity of smart city innovation (Winters, 2011).

Existing studies have examined the role of smart cities in fostering innovation, as well as the economic and social challenges associated with urban transformation (Caragliu & Del Bo, 2019; Kummitha, 2018; Vanolo, 2014, Marchesani & Ceci, 2025). However, the specific impact of urban innovation on youth entrepreneurship, and how socio-economic factors such as housing affordability mediate this relationship, remain insufficiently investigated. Theoretical debates on smart cities often assume that technological progress inherently benefits all urban stakeholders (D. B. Audretsch et al., 2015; Hatuka & Zur, 2020). This study challenges that assumption by questioning whether smart city advancements foster youth entrepreneurship equally, or whether they create new economic barriers that reshape urban entrepreneurial dynamics.

By adopting the Push and Pull framework, this research positions urban innovation as a potential enabler (pull factor) of youth entrepreneurship, while simultaneously recognizing housing costs as a constraint (push factor) (Kirkwood, 2009;

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Sahasranamam & Sud, 2016). This dual perspective allows for a more nuanced exploration of how urban innovation influences entrepreneurial entry, resilience, and long-term participation in smart cities, and whether escalating living costs distort or weaken these opportunities. The study builds on prior research on urban innovation and entrepreneurial ecosystems, extending it by focusing on the spatial and economic constraints that young entrepreneurs face in technologically advanced urban environments (D. B. Audretsch & Belitski, 2017).

Given the increasing policy focus on fostering smart city ecosystems that are not only technologically advanced but also socially inclusive, this study provides timely insights into how cities can balance innovation with affordability to maintain entrepreneurial vibrancy (Borkowska & Osborne, 2018; Hollands, 2008; Khurana & Dutta, 2024). Understanding the dynamics between digital transformation, youth entrepreneurship, and socio-economic barriers is essential for designing equitable smart city policies that do not inadvertently marginalize young business creators. By integrating longitudinal empirical analysis with theoretical insights, this research contributes to the ongoing debate on the role of smart cities in shaping future economic landscapes, offering a critical reassessment of the inclusivity of urban innovation in contemporary entrepreneurial ecosystems.

Purpose of the paper. *This study aims to explore the dual role of urban innovation as both a catalyst and a constraint for youth entrepreneurship in smart cities. While digital transformation and technological advancements are widely regarded as enablers of entrepreneurship (D. B. Audretsch et al., 2019; Kummitha, 2018; Marchesani et al., 2022), this paper critically examines whether these benefits extend equally to young entrepreneurs or if emerging socio-economic barriers, such as rising housing costs, create unintended constraints. By leveraging the Push and Pull Theory, this research investigates how urban innovation shapes youth entrepreneurial activities and whether housing affordability moderates this relationship. Specifically, the study seeks to answer two key research questions: "How does urban innovation in smart cities influence youth entrepreneurship?" and "To what extent do rising housing costs moderate the relationship between urban innovation and youth entrepreneurship?".*

The overarching goal is to challenge the assumption that smart cities foster inclusive entrepreneurship and to provide empirical evidence on whether high levels of urban innovation might inadvertently disincentivize young entrepreneurs by increasing financial barriers. In doing so, this research contributes to the ongoing debate on entrepreneurial ecosystems in urban settings, offering insights that are relevant for policymakers, urban planners, and scholars interested in the socio-economic dynamics of digital cities. By emphasizing the role of affordability and accessibility in fostering a sustainable and inclusive entrepreneurial environment, the study informs future urban policies aimed at balancing technological progress with social equity.

Methodology. *The study employs a quantitative research design based on a longitudinal panel data analysis covering 38 Italian cities over a 13-year period (2009–2022). This approach enables an in-depth investigation of how urban innovation influences youth entrepreneurship over time while considering the role of socio-economic constraints, particularly rising housing costs. The dataset integrates multiple national and international sources to ensure robustness and comprehensiveness. Youth entrepreneurship, the dependent variable, is measured as the number of businesses registered by entrepreneurs under the age of 35 relative to the total number of businesses in each city per year, using data from the Italian Chamber of Commerce. Urban innovation, the independent variable, is operationalized as a composite index incorporating multiple dimensions of smart city development, including digital public services, municipal app development, public R&D investment, broadband access, and the use of social media by municipal administrations, with data sourced from ISTAT, EUROSTAT, AGCOM, and municipal records. Housing costs, the moderating variable, are captured through an aggregated index of rental prices and property values across three urban zones (central, sub-central, and peripheral) using national real estate databases (www.immobiliare.it), municipal housing reports, and historical data retrieved from the Wayback Machine.*

To control for additional factors influencing youth entrepreneurship, the model includes several control variables such as population size and urban density to account for agglomeration effects, employment rates and GDP per capita to capture broader economic conditions, the total number of firms and entrepreneurial concentration to assess city-level business dynamics, and international connectivity, proxied by the presence of airports, to reflect a city's integration into global economic networks. Given the panel structure of the dataset, the study adopts the Generalized Method of Moments (GMM) estimator to address potential endogeneity issues and unobserved heterogeneity (Lee & Yu, 2014; Roodman, 2009; Windmeijer, 2005). This approach is particularly suited for dynamic panel models as it accounts for unobserved city-specific effects that could influence both urban innovation and youth entrepreneurship while mitigating endogeneity concerns through the inclusion of lagged dependent variables as instruments. The model also controls autocorrelation and heteroskedasticity to ensure the robustness of statistical inference.

The empirical analysis tests for a potential non-linear relationship between urban innovation and youth entrepreneurship by employing a quadratic specification. This allows for the examination of whether urban innovation initially fosters entrepreneurship but reaches a threshold beyond which its benefits diminish or reverse due to increased competition and rising living costs (Haans et al., 2016). The moderating effect of housing prices is assessed by introducing interaction terms between urban innovation and housing costs to evaluate whether affordability constraints alter the entrepreneurial potential of young individuals. According to Agostinelli (2002), stepwise regression approach is applied to progressively introduce control variables and interaction terms, ensuring that findings are not driven by omitted variable bias. To further refine the analysis, quantile regression is employed to explore whether the effects of urban innovation and housing costs vary across different levels of youth entrepreneurship activity, providing a more nuanced

understanding of whether financial constraints disproportionately affect early-stage entrepreneurs compared to more established young business owners.

To validate the robustness of the findings, multiple sensitivity analyses are conducted. The model is re-estimated using alternative measures of urban innovation, including smart city rankings and digitalization indices, to ensure consistency across different conceptualizations of urban technological development. A subsample analysis is performed to examine whether the effects vary based on economic and demographic factors, distinguishing between small and large cities as well as cities with high and low GDP levels. To further address endogeneity concerns, an instrumental variable (IV) estimation is conducted using historical smart city funding allocations as an exogenous instrument for urban innovation. Additionally, a variant inflation factor (VIF) analysis is carried out to detect and address potential multicollinearity among independent variables.

Results. *The preliminary results of this study indicate that urban innovation in smart cities plays a dual role in shaping youth entrepreneurship, acting as both a catalyst and a constraint. The initial findings suggest that technological advancements, digital infrastructure, and smart city policies foster youth entrepreneurial activity by providing enhanced access to resources, networks, and market opportunities. However, as urban innovation intensifies, the study observes a diminishing marginal effect, where excessive digitalization and economic transformation create heightened competition and increase financial barriers, particularly in housing affordability. This supports the hypothesis of an inverted U-shaped relationship, where urban innovation initially drives youth entrepreneurship but, beyond a threshold, its positive effects begin to decline.*

Moreover, preliminary evidence indicates that housing costs significantly moderate this relationship, exacerbating financial constraints for young entrepreneurs. In cities with higher living costs, the benefits of urban innovation appear to be counterbalanced by affordability barriers, reducing entrepreneurial entry and shifting young talent towards employment in established firms rather than new venture creation. This effect is particularly pronounced in highly digitized, economically developed cities, where urban attractiveness drives real estate demand and raises financial entry barriers for new businesses.

Preliminary analyses also reveal variations across city types, with larger metropolitan areas exhibiting stronger negative moderating effects due to higher living costs, while smaller smart cities with emerging digital ecosystems appear to offer more balanced conditions for youth entrepreneurship. These insights highlight the need for smart city policies that balance technological progress with socio-economic inclusivity, ensuring that urban innovation supports youth entrepreneurship without reinforcing structural inequalities. Further analyses will refine these findings to provide more concrete policy recommendations and theoretical contributions to the intersection of smart cities, youth entrepreneurship, and socio-economic barriers.

Research limitations. *This study has several limitations that should be considered. First, the analysis is limited to Italian cities, which may restrict the generalizability of the findings to other regions with different smart city policies and economic conditions. Future research could adopt a cross-country approach to capture broader variations in how urban innovation influences youth entrepreneurship.*

Second, urban innovation is measured through a composite index, which, while comprehensive, may not fully capture qualitative aspects such as governance effectiveness or policy implementation. Further studies could integrate case studies or qualitative analyses to complement these insights.

Third, the study considers youth entrepreneurship as a single category, without distinguishing between sectors or business models. Since urban innovation may have varying effects on different types of ventures, future research could explore sector-specific impacts and the distinction between necessity-driven and opportunity-driven entrepreneurs.

Fourth, housing costs are used as a proxy for socio-economic barriers, but other financial constraints, such as access to capital and operational costs, could also shape youth entrepreneurship. Expanding the analysis to include broader economic factors would provide a more comprehensive perspective.

Finally, while the quantitative approach ensures robustness, it does not capture individual entrepreneurial experiences. A mixed-methods approach incorporating qualitative data could offer deeper insights into how young entrepreneurs navigate smart city environments. Addressing these limitations would strengthen the study's contributions and refine its policy implications.

Managerial implications. *These preliminary findings could produce important managerial implications for policymakers, urban planners, and business leaders seeking to foster youth entrepreneurship in smart cities. First, urban innovation must be designed with inclusiveness in mind, ensuring that technological advancements do not create unintended barriers for young entrepreneurs. While digital infrastructure and smart city initiatives enhance business opportunities, excessive urban transformation can lead to higher living costs that disproportionately affect aspiring entrepreneurs with limited financial resources. Municipal governments should adopt balanced innovation policies that promote entrepreneurship while mitigating affordability challenges.*

Second, housing affordability should be integrated into smart city planning, as high living costs can limit the attractiveness of urban centers for young business founders. City administrations can implement measures such as affordable co-working spaces, targeted financial incentives, or zoning regulations that encourage mixed-income housing, preventing the exclusion of early-stage entrepreneurs from urban ecosystems.

Third, entrepreneurial support programs should be tailored to different business models, recognizing that not all young entrepreneurs benefit equally from urban innovation. High-tech startups may thrive in digitally advanced cities,

but small businesses and necessity-driven entrepreneurs could face greater difficulties in adapting to rapid technological change. Business incubators and public-private partnerships should provide sector-specific resources, including training, mentorship, and financial support, to ensure that diverse forms of youth entrepreneurship can flourish.

Fourth, public and private stakeholders should consider broader financial constraints beyond housing costs, as access to capital, regulatory frameworks, and operational expenses also shape youth entrepreneurial potential. Policymakers should work towards developing financial instruments, such as microloans, tax incentives, and venture capital initiatives specifically targeted at young entrepreneurs operating in smart city environments.

Finally, business leaders and urban policymakers must collaborate to align smart city strategies with economic sustainability. While digital transformation is essential for urban competitiveness, it should not come at the expense of entrepreneurial diversity and accessibility. A holistic approach that integrates technological progress, socio-economic policies, and entrepreneurial ecosystem development will be key to ensuring that smart cities remain dynamic, inclusive, and supportive of youth-led innovation.

Originality of the paper. *This study contributes to the smart city and entrepreneurship literature by offering a novel perspective on the dual role of urban innovation as both an enabler and a constraint for youth entrepreneurship. While existing research highlights the benefits of digital transformation, this paper challenges the assumption that smart city advancements automatically foster inclusive entrepreneurial ecosystems. By integrating the Push and Pull Theory, it introduces a non-linear approach to understanding how urban innovation impacts young entrepreneurs, emphasizing the moderating role of housing costs. Using longitudinal data and GMM estimation, the study provides empirical insights into how rising living costs can offset the positive effects of smart city initiatives. This research is among the first to quantitatively explore how economic barriers shape entrepreneurial opportunities in digitally advanced urban environments, offering critical policy and managerial implications for balancing innovation with affordability.*

Key words: *Youth Entrepreneurship; Smart City; Entrepreneurship; Housing Cost; Urban Innovation; City*

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Università e sviluppo regionale: costruire ecosistemi imprenditoriali in aree periferiche

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Abstract

Le università svolgono un ruolo chiave nello sviluppo regionale, soprattutto in aree periferiche caratterizzate da vulnerabilità economica e sociale. Questo studio analizza il contributo delle università nella creazione di ecosistemi imprenditoriali universitari (UEE), con un focus su due istituzioni italiane: l'Università della Calabria e l'Università di Camerino. Attraverso un approccio qualitativo basato su studi di caso, con interviste, osservazioni partecipanti e analisi di documenti secondari, la ricerca esplora i meccanismi con cui questi atenei favoriscono l'imprenditorialità e l'innovazione locale. I risultati preliminari evidenziano che tali istituzioni svolgono un ruolo cruciale nel colmare il divario di competenze e nella creazione di opportunità imprenditoriali attraverso incubatori, spin-off e collaborazioni con il tessuto produttivo locale. Il loro impegno nell'adattare l'offerta formativa e le strategie di terza missione alle esigenze territoriali può favorire la nascita di reti di innovazione e trasferimento tecnologico. Lo studio mira a proporre un framework teorico-empirico per comprendere e replicare tali dinamiche in altre aree periferiche.

Inquadramento della ricerca. *Le università sono oggi pienamente riconosciute come capaci di promuovere processi innovativi a livello territoriale. Ciò è particolarmente rilevante quando sono coinvolte aree periferiche (Benneworth, 2018). Infatti, le aree periferiche rappresentano contesti cruciali in termini di vulnerabilità e instabilità economica, sociale e politica (Rodríguez-Pose, 2018).*

Le università possono contribuire in modi diversi: giocano un ruolo chiave nella generazione di conoscenza, nella diffusione tecnologica, nella formazione del capitale umano e nel progresso sociale ed economico (Cinar & Benneworth, 2020; Marzocchi et al., 2019). In particolare, svolgono un ruolo essenziale nella creazione di ecosistemi imprenditoriali universitari (UEE), ovvero ambienti ricchi di risorse capaci di incentivare la crescita di imprese e innovazioni, offrendo agli studenti e agli attori locali strumenti concreti per trasformare idee in iniziative imprenditoriali (Audretsch et al., 2024; Miller et al., 2017). Gli ecosistemi imprenditoriali (EE) pongono l'imprenditorialità al centro dello sviluppo regionale, enfatizzando l'interazione tra il sistema di supporto locale e le organizzazioni (imprese, associazioni ecc.) presenti (Cho et al., 2021). Parallelamente, la letteratura accademica si è concentrata sull'analisi del contributo degli istituti di istruzione superiore allo sviluppo economico regionale e alla trasformazione sociale (Breznitz & Zhang, 2019). L'ecosistema imprenditoriale (EE) è stato descritto come "un insieme di attori e fattori indipendenti che collaborano per facilitare l'imprenditorialità produttiva", evidenziando come il contesto territoriale sia un elemento determinante (Stam, 2015, p. 1765). L'imprenditorialità è cruciale per il progresso innovativo delle regioni, e il concetto di EE deve tener conto della comunità socio-economica regionale di riferimento (Khlystova et al., 2022). A seconda della tipologia di università e della sede dell'istituzione, la costituzione di un ecosistema imprenditoriale e di sviluppo può essere condizionata da diversi fattori, tra cui il coinvolgimento degli stakeholder, le risorse interne ed esterne, l'incubazione di nuove imprese, sia in modalità fisica che virtuale (Radko et al., 2023). Tali meccanismi sono essenziali sia per l'ecosistema imprenditoriale universitario (UEE) sia per il contesto economico regionale in senso più ampio.

Su tali tematiche, mentre la ricerca si è largamente focalizzata sul ruolo delle università nelle regioni economicamente avanzate, esistono meno studi sul loro impatto nelle aree periferiche, dove il loro operato risulta più articolato e complesso (Pinheiro et al., 2012). In questi contesti, spesso caratterizzati da carenze infrastrutturali e di servizi, le università assumono un ruolo di compensazione per colmare tali lacune (Pinto et al., 2018). Esse possono attrarre e sviluppare conoscenze, diffonderle sul territorio e promuovere la crescita del capitale umano, stimolando un contesto favorevole allo sviluppo economico e sociale. Tuttavia, raggiungere questi obiettivi è complicato: gli atenei situati in aree periferiche, oltre a dover fronteggiare vincoli economici e gestionali, devono equilibrare le loro missioni istituzionali (ricerca, didattica e terza missione) con l'impegno nei confronti della comunità locale e delle imprese del territorio (Fernández-Esquinas & Pinto, 2014; Benneworth et al., 2017). Le università che operano su contesti regionali complessi possono incontrare diversi ostacoli, tra cui: (1) Risorse finanziarie limitate per le attività a livello regionale rispetto ai fondi destinati a ricerca, scienza e didattica; (2) riduzioni della spesa pubblica conseguenti alle misure di

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austerità post-crisi economica; (3) adozione crescente di metriche standardizzate di valutazione nell'istruzione superiore, che impongono modelli uniformi incentrati su pubblicazioni e trasferimento tecnologico; (4) riforme istituzionali in diversi paesi che favoriscono fusioni tra atenei, riducendo la diversificazione dei sistemi universitari (Pinheiro et al., 2015).

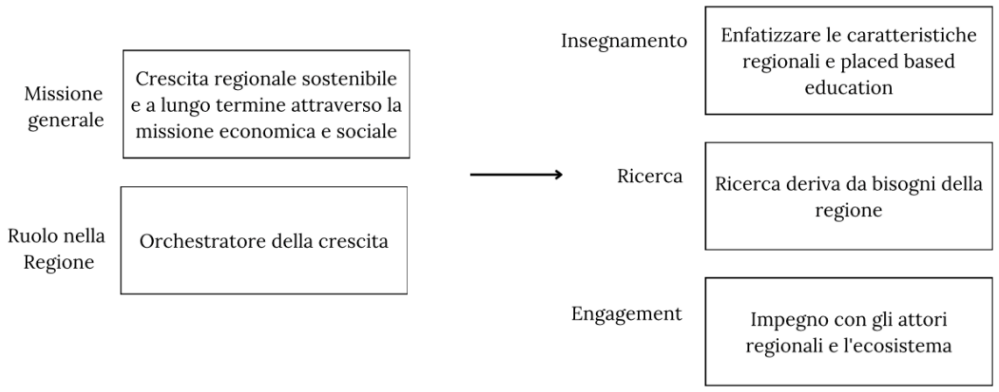
Questa ricerca parte dalla consapevolezza che operare come università in un contesto periferico comporta la necessità di rispondere a sfide e bisogni differenti rispetto agli atenei situati in contesti urbani (Benneworth, 2018). Per questo motivo, lo studio degli ecosistemi imprenditoriali in tali aree richiede metodologie e approcci specifici. Seguendo questa prospettiva, la ricerca propone un'analisi qualitativa su università situate in aree periferiche e impegnate nello sviluppo di un UEE, con particolare attenzione ai processi che ne determinano la configurazione. L'indagine adotta un approccio multidisciplinare (economico, sociale e regionale) e integra analisi empiriche sul campo, con l'obiettivo di proporre un framework innovativo applicabile anche ad altre aree periferiche europee.

Obiettivo della ricerca. *Lo studio presentato si propone di analizzare il modo in cui le università situate in aree periferiche possano sviluppare ecosistemi imprenditoriali universitari (UEEs) che rispondano alle specificità territoriali. L'obiettivo è ampliare la comprensione di questi ecosistemi in contesti periferici, spesso meno indagati rispetto alle realtà urbane, attraverso un quadro teorico ed empirico che integri le missioni universitarie con le peculiarità del territorio. La ricerca si basa su due ampi filoni di letteratura: il primo relativo al rapporto tra università e sviluppo regionale nelle aree periferiche e il secondo dedicato agli UEEs. A tale scopo, vengono adottati due framework di riferimento. Il primo, relativo alle componenti essenziali di un UEE (Alam et al., 2024), è illustrato in Tabella 1.*

Componenti	*Descrizione*
Politiche	*Regolamenti e normative che supportano l'imprenditorialità regionale*
Educazione e formazione imprenditoriale	*Sviluppo di competenze e conoscenze per il successo imprenditoriale*
Capitale d'investimento	*Disponibilità di risorse finanziarie per avviare e gestire imprese*
Infrastrutture	*sistemi di trasporto, accesso a internet, incubatori e spazi di innovazione*
Servizi di supporto	*consulenze legali, contabili e strategiche per le start-up*
Rete di contatti	*Connessioni con stakeholder chiave dell'ecosistema imprenditoriale*
Mentori	*Figure di riferimento che guidano gli imprenditori nel processo di avvio e crescita*
Cultura di supporto	*atteggiamenti e percezioni regionali nei confronti dell'imprenditorialità*

Componenti chiave di un UEE (Alam et al., 2024)

Il secondo framework di riferimento riguarda il ruolo delle università nello sviluppo territoriale e si basa sull'integrazione dei concetti di entrepreneurial university ed engaged university (Breznitz & Feldman, 2012; Guerrero et al., 2014). In questa prospettiva, le università non si limitano alla commercializzazione delle attività di ricerca o alla formazione degli studenti in funzione dei benefici regionali, ma assumono un ruolo attivo nel rispondere alle sfide e alle esigenze specifiche del territorio in cui operano (Cho et al., 2024). Il framework adottato evidenzia come le attività di insegnamento, ricerca e engagement debbano svilupparsi in stretta relazione con il contesto locale, coinvolgendo gli attori regionali non solo come destinatari, ma anche come partner strategici nel processo di creazione e consolidamento degli ecosistemi imprenditoriali universitari. In Figura 1 è illustrato il framework di riferimento.



Il framework dell'Università nella propria regione (Thomas et al., 2023)

Per condurre l'analisi, sono state selezionate due università italiane con un ruolo rilevante nel contesto regionale: l'Università della Calabria e l'Università di Camerino.

La Calabria è una delle regioni italiane meno sviluppate, con un'economia ancora distante dagli standard di altre aree del Paese (Lazzeroni, 2020). L'Università della Calabria opera, dunque, in un territorio segnato da alti livelli di disoccupazione, carenze infrastrutturali e un significativo spopolamento (Istat, 2023a). Anche l'Università di Camerino, pur situata in un contesto diverso, svolge un ruolo cruciale in un'area non metropolitana e geograficamente distante dai centri urbani e/o metropolitani (Barca, 2009).

L'Università della Calabria, istituita nel 1968 a Rende (CS), è stata concepita sin dall'inizio come un elemento strategico per favorire lo sviluppo locale. Collocata in un'area storicamente segnata da difficoltà economiche e sociali, la sua creazione mirava a innescare una trasformazione significativa del territorio (Bartucci, 2018). Il primo rettore, l'economista Beniamino Andreatta, elaborò un piano volto a promuovere la crescita socio-economica in una Regione che, all'epoca, si trovava lontana dai principali poli universitari, fondando il primo campus universitario in Italia con il motto "Campus per Eccellenza".

L'Università di Camerino, invece, è tra le istituzioni accademiche più antiche del Paese e sorge in un'area interna, distante dalle grandi città. La storia di questo territorio è stata segnata da eventi critici, sia storici che naturali, che hanno generato fasi di instabilità e situazioni di emergenza, tra cui il devastante terremoto del 2016 (Lazzeroni, 2020). Il sisma ha gravemente danneggiato numerosi edifici del centro storico, contribuendo a un significativo calo demografico. Tra il 2016 e il 2022, la popolazione nei comuni del cratere sismico si è ridotta del 6,3%, evidenziando una progressiva desertificazione demografica (Istat, 2023b). In questo contesto, l'UniCam ha sempre rappresentato un punto di riferimento culturale e sociale per la comunità locale, assumendo un ruolo fondamentale nei processi di ricostruzione post-sismica.

Alla luce della crescente rilevanza degli UEEs nel supportare lo sviluppo delle economie locali e nel rispondere alle sfide dei territori marginalizzati (Burke et al., 2024), questo studio analizza il ruolo di UniCal e UniCam come attori chiave nel rafforzamento della resilienza territoriale e nella costruzione di ecosistemi imprenditoriali che rispecchino le caratteristiche e le esigenze delle aree periferiche in cui operano (Breznitz & Feldman, 2012).

Da queste premesse emerge la seguente domanda di ricerca:

"In che modo le università situate in aree periferiche possono sviluppare ecosistemi imprenditoriali universitari (UEEs) che rispondano alle specificità territoriali e contribuiscano allo sviluppo economico e sociale delle loro regioni?"

Metodologia della ricerca. *La metodologia adottata in questo studio si basa sull'approccio della grounded theory, che permette un'analisi sistematica dei dati raccolti per identificare i temi e i concetti emergenti (Glaser & Strauss, 2017). Questo approccio risulta particolarmente adeguato, considerando che la letteratura sugli UEEs in contesti periferici è ancora in fase di sviluppo (Suddaby, 2006). Per esplorare il ruolo delle università nello sviluppo regionale di aree periferiche e la loro capacità di generare ecosistemi imprenditoriali universitari, la ricerca segue un metodo qualitativo basato su studi di caso (Yin, 2009). Questo ha consentito di approfondire la comprensione del fenomeno degli UEEs in contesti non metropolitani e del loro impatto sulle dinamiche territoriali.*

Abbiamo sviluppato due programmi di ricerca a lungo termine, condotti separatamente nelle due istituzioni analizzate, ma con il coinvolgimento di ricercatori comuni. In questa analisi, l'università è considerata come l'unità primaria di studio, permettendo di esplorarne le specifiche caratteristiche, strategie e interazioni con il territorio. Sebbene gli studi di caso non abbiano generalmente un valore di generalizzabilità statistica, essi offrono quadri interpretativi significativi e sono ampiamente utilizzati per la costruzione teorica nel campo dello sviluppo regionale e dell'imprenditorialità accademica.

Il caso analizzato ha previsto tre principali metodi di raccolta dati:

1. *Interviste semi-strutturate. Sono stati raccolti dati attraverso interviste a stakeholder locali (professori, imprenditori, amministratori, studenti, rappresentanti di organizzazioni che operano localmente ecc.) per comprendere come le università bilancino le esigenze sociali, l'innovazione tecnologica e l'imprenditorialità, mettendo a confronto modelli teorici con le evidenze empiriche.*
2. *Osservazione partecipante. L'analisi degli UEEs e del loro ruolo nei territori di riferimento è stata arricchita da un'attività di osservazione sul campo presso incubatori, associazioni universitarie e campus. Durante queste attività, i ricercatori hanno avuto interlocuzioni con figure chiave che operano all'interno dell'ecosistema universitario (es. delegati alla terza missione, studenti, giornalisti locali). L'osservazione ha incluso anche la partecipazione a eventi pubblici rilevanti.*
3. *Analisi di documenti e media. Sono stati esaminati documenti ufficiali e materiali pubblici, inclusi report istituzionali, articoli di giornale, discorsi, presentazioni (pitch), siti web, documenti aziendali, video, blog, tweet, feed di LinkedIn e altre fonti digitali.*

Sono state condotte interviste semi-strutturate con 30 individui, selezionati tra adulti (maggiori di 18 anni) coinvolti direttamente nelle dinamiche universitarie e nei loro impatti. Il campionamento non ha seguito criteri specifici legati a genere, etnia o stato di salute, ma ha mirato a includere un insieme rappresentativo di soggetti connessi all'Università della Calabria e all'Università di Camerino. Le interviste proseguiranno fino al raggiungimento della saturazione tematica.

Nella fase conclusiva, i dati raccolti verranno analizzati per sviluppare un modello teorico-empirico che descriva come le università periferiche configurano e alimentano gli UEEs, individuando i fattori chiave che ne favoriscono lo sviluppo socioeconomico e imprenditoriale. Le attività di ricerca proseguiranno nei prossimi mesi per consolidare le osservazioni iniziali.

Per l'analisi tematica è stato adottato il metodo Gioia, che permette di identificare schemi e temi emergenti nelle relazioni tra i costrutti. L'analisi è stata condotta utilizzando il software Atlas, che facilita l'elaborazione di dati qualitativi complessi, provenienti da testi, trascrizioni e file audio. Il metodo Gioia si articola in tre fasi: (1)

identificazione dei concetti di primo livello (first-order concepts, codifica), (2) individuazione dei temi di secondo livello (second-order themes) e (3) definizione delle dimensioni di terzo livello (third-order dimensions) (Gioia et al., 2012).

Infine, per garantire la validità e l'affidabilità delle interpretazioni, sono state impiegate tecniche di triangolazione, confrontando i risultati ottenuti da diverse fonti di dati.

Risultati preliminari e risultati attesi. *L'analisi ha l'obiettivo di identificare i risultati chiave che permettono a un'università situata in una regione periferica di contribuire allo sviluppo regionale e di creare ecosistemi imprenditoriali in grado di rispondere ai bisogni locali.*

Il terzo e ultimo step del metodo Gioia rende possibile la formulazione degli output della ricerca, che costituiranno la base per un nuovo framework. Tale framework unisce gli elementi chiave di un ecosistema imprenditoriale universitario (UEE) (Tabella 1) con le caratteristiche delle università e delle regioni in cui operano, dove si svolgono attività imprenditoriali e di engagement (Figura 1).

Le analisi delle interviste e delle osservazioni svolte fino ad ora hanno mostrato alcuni risultati preliminari in riferimento all'Università della Calabria e di Camerino, le quali sembrano svolgere effettivamente un ruolo di promozione della crescita regionale (Thomas et al., 2023), cercando di superare la tensione tra attività di commercializzazione della ricerca (Ambos et al., 2008) e coinvolgimento civico (Breznitz & Feldman, 2012). Alla conclusione dell'analisi, i ricercatori si attendono che i risultati evidenzino anche il ruolo delle Università nel favorire e preservare una rete di relazioni tra gli stakeholder di un ecosistema imprenditoriale.

Sebbene il potenziale di queste università di stimolare l'imprenditorialità e il cambiamento economico e sociale sia già emerso, i risultati concreti sono ancora in fase di codifica. I primi elementi emersi indicano che tali università hanno agito come catalizzatori di sviluppo per la Calabria e le Marche, in particolare grazie alla loro capacità di colmare il divario tra il centro e le aree periferiche. Dalle interviste condotte con docenti, responsabili delle attività di trasferimento tecnologico e di public engagement, nonché imprenditori locali, è emerso che l'elemento distintivo dell'Università della Calabria e dell'Università di Camerino non è solo l'integrazione tra educazione, ricerca e trasferimento tecnologico, ma il modo in cui queste funzioni vengono adattate alle esigenze di territori caratterizzati da una minore densità industriale e da un accesso limitato alle reti di innovazione nazionali. Nel dettaglio, hanno la potenzialità di mantenere ma anche attrarre potenziali talenti, concorrere alla nascita di imprese locali e favorire la circolazione di conoscenze in contesti spesso esclusi dai principali circuiti dell'innovazione. Secondo quanto emerso da una intervista:

"Oggi questa università ha una grande opportunità di fare da ponte tra il mondo accademico e l'imprenditorialità locale, e per farlo bisogna continuare a lavorare per colmare il gap tra l'insegnamento teorico e l'applicazione pratica sul campo".

L'attività di supporto imprenditoriale, attraverso incubatori, laboratori di innovazione e programmi di accelerazione, ha iniziato a produrre effetti positivi in entrambe le università, seppur con ritmi e impatti differenti. Nell'Università della Calabria, il modello di incubazione si sta consolidando grazie a una crescente collaborazione con il tessuto imprenditoriale locale che si sta sviluppando negli anni - come l'apertura di una sede di NTT Data e Accenture -. Diversamente, nell'Università di Camerino, gli effetti di queste iniziative sono ancora in una fase embrionale, complicati dalle difficoltà strutturali legate al terremoto del 2016 e ai ritardi nella ricostruzione, che hanno ridotto la capacità di attrarre investimenti e trattenere talenti.

"L'incubatore di UniCam è un ottimo esempio di come l'università possa stimolare la nascita di imprese, ma il vero impatto arriverà solo se riusciremo a consolidare una rete di supporto più forte tra università e imprese locali."

Nonostante queste sfide, l'incubatore di UniCam rappresenta un'opportunità concreta per favorire la ripresa economica della zona, a patto che si riesca a rafforzare le connessioni tra università, imprese locali e istituzioni, ricreando quell'ecosistema di innovazione che ha subito un'interruzione significativa a seguito del sisma.

Nel loro ruolo di agenti di sviluppo regionale nelle aree periferiche, le università hanno il compito di rafforzare le capacità locali di innovazione e imprenditorialità, contribuendo a ridurre il divario di conoscenza e competenze tra il territorio e la ricerca accademica (Rodriguez-Pose, 2018). Più che colmare un generico divario tra conoscenza accademica e territorio, queste università si trovano a operare in ambienti in cui la mancanza di infrastrutture e la fuga di talenti limitano la creazione di ecosistemi imprenditoriali solidi.

L'Università della Calabria ha avviato diverse iniziative per supportare l'imprenditorialità, quali ad esempio l'incubatore accademico TechNest, nato appositamente per offrire a team di persone fisiche, spin-off e startup innovative anche esterne all'Università l'accesso a programmi di incubazione. Il programma di mentorship risulta ancora in fase di sviluppo e la connessione tra le attività di ricerca universitaria e il tessuto produttivo regionale può essere ulteriormente rafforzata, anche al fine di contribuire allo sviluppo di nuovi spinoff. Come ha osservato un intervistato, "manca ancora la forte integrazione tra i progetti di ricerca e le esigenze delle imprese locali."

L'Università di Camerino, invece, si trova ad affrontare sfide ancora più complesse a causa delle conseguenze del sisma del 2016. Nonostante le difficoltà strutturali, l'ateneo sta cercando di capitalizzare le proprie risorse e sviluppare iniziative volte a stimolare l'innovazione, come dimostra il crescente impegno specialmente nei programmi di formazione imprenditoriale. Come sottolineato da un intervistato, "ci vuole tempo per cambiare il modo in cui i giovani vedono l'imprenditorialità. Le università stanno facendo un ottimo lavoro nel promuovere l'educazione imprenditoriale, ma dobbiamo fare di più per far capire che l'imprenditorialità è una carriera concreta e non solo una teoria."

Sebbene i primi risultati siano in generale positivi, gli esiti definitivi dipenderanno dalle successive analisi che sono ancora in corso d'opera.

L'ecosistema imprenditoriale universitario (UEE) ha il potenziale per diventare una leva strategica per lo sviluppo regionale (Cho et al., 2024), ma questo scenario è ancora in fase di costruzione e di verifica. I risultati preliminari suggeriscono che il processo di integrazione tra le due università e il territorio è in corso. Sarà fondamentale che nei prossimi mesi emerga una maggiore coesione tra le iniziative locali, i programmi di ricerca applicata dalle Università e le necessità imprenditoriali delle regioni.

Sebbene i primi segnali siano incoraggianti, i risultati finali non possono essere considerati definitivi.

Limiti della ricerca. *Questa ricerca presenta alcune limitazioni che è opportuno tenere in considerazione. Innanzitutto, l'analisi si basa su dati qualitativi raccolti attraverso interviste, osservazioni dirette e fonti secondarie, i quali possono essere soggetti a interpretazioni soggettive da parte dei ricercatori. Per ridurre al minimo eventuali distorsioni, sono state adottate strategie di triangolazione e verifica con i partecipanti.*

Un altro aspetto da considerare riguarda la composizione del campione e i criteri adottati per la selezione degli stakeholder, che potrebbero aver condizionato la varietà e la profondità delle informazioni ottenute. In particolare, la scelta di focalizzarsi su due università situate in contesti periferici potrebbe limitare la possibilità di estendere i risultati ad altre realtà. Per superare questa restrizione, ricerche future potrebbero adottare un approccio combinato tra metodi qualitativi e quantitativi (Creswell & Creswell, 2018) e includere un numero più ampio di casi. Inoltre, sarebbe utile ampliare l'ambito dello studio su scala nazionale, considerando ulteriori università situate in diverse aree periferiche italiane.

Un'ulteriore limitazione riguarda la specificità geografica della ricerca, che si concentra esclusivamente su istituzioni accademiche italiane. Ciò potrebbe non consentire un confronto diretto con altre realtà internazionali. Tuttavia, alcuni studi evidenziano l'Italia come un contesto significativo per l'analisi dello sviluppo regionale (Bellandi et al., 2021; Bellandi & Santini, 2019). Indagini condotte in altri paesi europei potrebbero servire a testare la validità dei risultati emersi.

Infine, è importante sottolineare che la ricerca è stata realizzata in un preciso periodo temporale. Poiché sia l'ambiente accademico sia quello socioeconomico sono soggetti a continui cambiamenti, i risultati potrebbero non mantenere la stessa rilevanza nel tempo. Per affrontare questa sfida, studi futuri potrebbero adottare un disegno longitudinale, utile a monitorare l'evoluzione del fenomeno e a garantire la continua attualità delle conclusioni raggiunte.

Implicazioni manageriali. *La ricerca mira a fornire raccomandazioni pratiche per le università situate in aree periferiche che intendono sviluppare ecosistemi imprenditoriali universitari (UEEs) in grado di rispondere alle specificità territoriali e di favorire lo sviluppo socioeconomico regionale. Per tali motivi, i risultati di questo studio possono avere rilevanti implicazioni per la governance e il management universitario, per i responsabili delle politiche accademiche e per gli stakeholder coinvolti nella creazione e nel consolidamento di tali ecosistemi a livello locale.*

La ricerca ha già evidenziato, in continuità con precedenti studi (Fernandez-Esquinas & Pinto, 2014; Pinto et al., 2018; Benneworth et al., 2017), la necessità per le università di integrare in modo strategico le proprie missioni istituzionali - didattica, ricerca e terza missione - con le esigenze specifiche del territorio. Ciò implica una maggiore attenzione alla creazione di programmi formativi mirati allo sviluppo di competenze imprenditoriali. Inoltre, la costruzione di un ecosistema imprenditoriale efficace richiede un impegno proattivo nel rafforzare le reti di collaborazione con amministrazioni locali, imprese, associazioni di categoria e investitori (Audretsch et al., 2024; Miller & Acs, 2017). Questa ricerca evidenzia come le università possano assumere un ruolo di orchestratori della crescita regionale (Thomas et al., 2023), di facilitatori e promotori del dialogo tra questi attori (Thomas & Pugh, 2020), favorendo un ambiente favorevole alla nascita e alla crescita di nuove iniziative imprenditoriali (Pugh et al., 2021). A tale scopo, è cruciale lo sviluppo di infrastrutture adeguate, quali incubatori, acceleratori e spazi di co-working, che possano supportare concretamente le start-up e gli spin-off accademici (Cunningham et al., 2022).

Un'ulteriore implicazione riguarda la necessità di adattare le strategie di engagement e comunicazione per valorizzare l'impatto degli UEE nei contesti periferici. In particolare, la promozione di una cultura imprenditoriale regionale può essere incentivata attraverso eventi, programmi di mentoring e percorsi di accompagnamento per aspiranti imprenditori (Breznitz & Zhang, 2019).

Originalità del paper. *Questa ricerca offre diversi contributi originali alla letteratura esistente sugli ecosistemi imprenditoriali universitari (UEEs) (Miller & Acs, 2017; Gueguen & Delanoe-Gueguen, 2021; Hayter et al., 2018) e sul ruolo delle università nello sviluppo regionale (Breznitz & Feldman, 2010; Goddard et al., 2016), con particolare attenzione ai contesti periferici (Storti et al., 2023; Palmieri, 2015). In primo luogo, lo studio nasce da una lacuna nella letteratura, che ha prevalentemente analizzato gli UEEs in contesti urbani o altamente sviluppati, trascurando le sfide e le opportunità specifiche delle università situate in aree periferiche (Pinheiro et al., 2012). Esplorando il modo in cui questi istituti possono adattare e modellare i loro ecosistemi imprenditoriali in funzione delle caratteristiche territoriali, si vuole offrire una prospettiva innovativa e ancora poco approfondita.*

Un ulteriore elemento di originalità risiede nell'approccio empirico adottato, che permette di analizzare in modo approfondito e contestualizzato il fenomeno degli UEEs nelle specifiche aree periferiche selezionate. Lo studio conferma e amplia modelli teorici esistenti (Breznitz & Feldman, 2010; Goddard et al., 2016; Rodriguez-Pose, 2018), ma mira a fornire nuove evidenze sulle strategie più efficaci per rafforzare gli ecosistemi imprenditoriali universitari in contesti meno favoriti.

Infine, il lavoro contribuisce a una comprensione più sfumata del ruolo delle università non solo come istituzioni accademiche, ma come attori chiave dello sviluppo sociale locale. Volendo mettere in luce le strategie e le pratiche che possono rendere gli UEE più sostenibili nel lungo periodo, la ricerca offre spunti utili non solo per la letteratura accademica, ma anche per i decisori politici e i manager universitari interessati a massimizzare l'impatto delle università nei territori periferici.

Parole chiave: *università nelle periferie; sviluppo territoriale; ecosistemi imprenditoriali universitari; innovazione*

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How do strategic decision-makers make sense of Artificial Intelligence?

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Abstract

This study aims to explore how the perception of Artificial Intelligence (AI) is constructed by strategic decision-makers, by adopting a sensemaking perspective. We conduct a cross-country qualitative study based on semi-structured interviews to investigate, via reflexive thematic analysis, which cognitive mechanisms shape different ways of understanding AI. Our findings evidence that there are some macro-themes through which the perception of AI is developed: vision, personal adaptability, praxis, reluctance, AI accessibility, decision-making quality and knowledge management. Based on the degree of importance attributed to them and on the sentiment embodied by decision-makers toward them, different (non-mutually exclusive) sensemaking approaches emerge: AI as a peer advisor, AI like any other technology, AI as humans' binoculars, AI as incompatible with strategic needs.

Framing of the research. *AI systems are evolving and spreading at a rapid pale, reshaping both our daily lives and professional activities in unprecedented ways. Within organisations, the impact of AI is huge for decision-making processes at all levels, spanning from routine, operational decisions that require (often fully automatised for greater efficiency) to infrequent and complex strategic decisions (Shrestha et al., 2019). However, the application of AI at an organisational strategic level is still limited and there is therefore wide scope for improvement in terms of adoption and awareness in using it. What may influence the decision to use AI or not in support of strategic decisions is the way AI and the potential collaboration with human intelligence is perceived.*

Purpose of the paper. *The purpose of this work is to study how Artificial Intelligence is perceived and conceptualised by strategists by using a sensemaking perspective. The study is guided by the following research question: How do strategic decision makers make sense of AI as a support tool for their decisions? To address this question, we investigate their perception of AI barriers, drivers and outcomes in order to reach a broad understanding of different ways of viewing it. Existing management literature has adopted the lens of sensemaking to investigate several phenomena (e.g. IT adoption (Hsieh et al., 2011), IT value (Tallon and Kraemer, 2007), coopetition (Lundgren-Henriksson and Kock, 2016), CSR (Sendlhofer and Tolstoy, 2022)). Building on this body of research, our paper aims to capture underlying mechanisms of sensemaking of such a disruptive phenomenon like AI adoption at a strategic level within an organisation.*

Literature considerations.

Sensemaking theory as theoretical lens

The term sensemaking was introduced by the organisational psychologist Karl Weick to define the process performed by leaders to make sense of the surrounding context and of the complex and shifting phenomena characterising it. He literally defines it as "making of sense"(Weick, 1995).

Sensemaking has also been theorised as a key leadership capability included in a broader "4-Cap" model that encompasses: sensemaking, relating, visioning, and inventing (Ancona et al., 2007), as well as a crucial capability for leaders to "explore the wider system, create a map of that system, and act in the system to learn from it" (Ancona, 2012), enabling them to effectively face the unknown.

Weick's model of sensemaking has been developed over the years (Weick, 1979, Weick, 1988, Weick, 1995, Weick et al., 2005), entailing changes and updates that eventually lead to the following conceptualisation: ecological change, enactment, selection, retention (Cristofaro, 2022). Ecological change refers to all those trigger events arising from a chaotic reality and that represent the input of a sensemaking process. To address the complexity of such events, leaders as decision makers undergo the enactment phase: they apply existing mental models to maximise the understanding of the world - the so called noticing activity - and create their own representation of reality (bracketed environments) through what is defined bracketing activity. People therefore go beyond mere observation and interpretation of events, by enacting and creating their own reality. Leaders are then engaged in the selection activity that comprises the application of mental models with the purpose to categorise cues and reduce equivocality and ambiguity, thus creating a

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reasoning or schema that are consistent with the past events and preconceptions (i.e. extraction of cues and retrospection activities). Eventually, the selected schema is retained based on plausibility evaluation (selective retention). This schema in turn influences future ways of building meaning.

In summary, sensemaking within organisations enables leaders to make clarity out of complex and uncertain situations by leveraging cues that emerge from the environment to a create plausible understanding of the event that eventually feeds future sensemaking (Maitlis, 2005, Maitlis and Christianson, 2014, Weick, 1995, Weick et al., 2005).

At organisational level, sensemaking is considered a core activity that impacts, innovation processes (Drazin et al., 1999, Hill and Levenhagen, 1995, Möller, 2010, Shin et al., 2017), learning (Christianson et al., 2009, Schwandt, 2005, Thomas et al., 2001), as well as strategy and decision-making (Gioia and Chittipeddi, 1991, Gioia and Thomas, 1996, Kurtz and Snowden, 2003, Rouleau, 2005, Thomas et al., 1993). Drawing on the idea that strategists as individuals and as decision-makers may make sense of AI differently as a result of several individual, organisational and environmental factors, we aim to investigate which are these underlying cognitive mechanisms shaping their perception of AI and how these mechanisms are connected to different sensemaking approaches.

Methodology.

Exploratory cross-country qualitative study

A qualitative approach is deemed appropriate, given the exploratory nature of the study, which aims to enhance the general understanding of a complex and still understudied topic, as the adoption of AI to support strategic decision-making. Qualitative research is suitable to accomplish this goal since it enables a direct interaction with people who have hands-on experience, and exploring their in-depth views, perspectives and interpretations of phenomena and, in particular, of processes (Hinings, 1997). The resulting insights may represent a starting point to expand the existing theoretical perspective in the field (Creswell and Poth, 2016).

Among qualitative approaches, the basic qualitative study was selected (Merriam and Tisdell, 2015). The main justification for this choice is that the focus of the study is on meaning, rather than on a specific bounded system. The unit of analysis is represented by managers as individuals responsible for making strategic decisions.

Our study is exploratory in nature since it aims at capturing the different perspectives of managers involved in strategic decision-making. This level of decision-making, compared to the tactical and operational one, is still less impacted by the use of AI tools, whose use is still limited. This poses the need for a deeper investigation of how AI is perceived by strategists, to enhance the overall understanding of the mechanisms underlying AI adoption and use at a strategic level and future avenues of research. Our study is a cross-country qualitative study. Indeed, participants from both Italy and North East of England have been involved.

Sampling and data collection

We have adopted purposeful sampling to select potential participants (decision-makers at a strategic level) who can provide rich, relevant, and insightful data for the study (Patton, 1990). In particular: we have contacted 100 potential participants, operating both in Italy and in the North of England. We have received 40 replies and we have conducted 33 interviews.

There are contrasting guidelines in the literature concerning sample size for interview-based qualitative studies: ≥ 15 (Bertaux, 1981), 12-60 (Baker and Edwards, 2012), 5-25 (Brinkmann and Kvale, 2015). However, we believe that we reached data saturation since many participants referred to similar contents during the interviews.

Table 1 provides details about the interviewees constituting the final sample.

We have relied on semi-structured interviews as data collection method. The interview protocol was grounded on existing literature. In particular, it included questions on the strategic decision-making process, on the current use or non-use of AI, on the perceived barriers, drivers, outcomes and bias of using AI.

All the semi-structured interviews were conducted via an online platform, four of them in English and 29 in Italian, ranging from 30 to 45 minutes in duration. All interviews took place between September and December 2024.

The participants to our study shared reflections based on both their direct experience and their perceptions of other decision-makers' experiences from their network (e.g. those who show to recognise the potential and the value of AI also provide insights on the behaviour and approach of those who they think are not open to implementing and using it). Therefore, our findings arise from both these direct and indirect perceptions. In addition to the interview transcripts, field notes taken by the author conducting the interview were included in the final dataset. Those notes allow to account for impressions of the researcher that capture nuances emerging from participants' tone and attitude. This combination of data contributed to the final theorizations of strategists' sensemaking approaches to AI for strategic decision making.

Data analysis

All interviews were analysed in their original language (Italian or English) to preserve the nuances of meaning conveyed by participants in their preferred language. The transcripts were initially read multiple times in order to familiarise with the data and some notes were taken on some initial impressions (Yin, 2011). The transcripts were subsequently uploaded into NVIVO 14 to conduct the analysis in a structured way.

We conducted reflexive thematic analysis (Braun and Clarke, 2006, Braun and Clarke, 2021, Cooper et al., 2012), which allows to deeply and iteratively engage with the data, relying on the researcher's reflections to augment the overall understanding of concepts. The analysis was conducted adopting an inductive approach (Patton, 2014) and encompassed

repeated cycles of reading to review and refine the coding structure, as well as an effort in constructing meaningful narratives to explain the derived second and third order codes (see Table 2).

Tab. 1: Sample of participants

ID	Job Title	Male/ Female
1	Founder & Managing Director	Male
2	Sales Account	Male
3	Founder & CEO	Male
4	General Management Consultant	Male
5	Intelligent Automation Expert, Senior Advisor and Managing Director	Male
6	CFO	Male
7	Innovation Manager	Male
8	Director of Organization & Management Systems - Former CEO, CFO and Controller	Male
9	Accountable Manager & Executive Director Engineering	Male
10	Co-founder and President	Male
11	Founder & Managing Director	Male
12	Chief Operating Officer	Male
13	Chief Administrative Officer	Male
14	Head	Male
15	Chief Executive Officer/Managing Director	Male
16	Chief Executive Officer & Co-founder	Male
17	Founder & Managing Director	Female
18	Head of Supply Engineering	Male
19	Chief Marketing Officer	Male
20	Director	Male
21	Senior Consultant	Male
22	Managing Director	Male
23	Chief Financial Officer	Male
24	Founder & CEO	Male
25	Founder & CEO	Male
26	Co-founder and CEO	Female

In analysing the data, we adopted a sensemaking lens to investigate how strategic decision makers perceive and therefore make sense of AI as a potential support to their decision making process. As we immersed ourselves in the interview transcripts and notes, we gradually realised that the emerging categories and themes were consistent with some overarching narratives and conceptualisations of AI, which can also partially overlap, and that we refer to as sensemaking approaches. Such approaches are grounded on some cognitive mechanisms (our third-order themes). The themes and categories are embodied (e.g. through an attitude or a tone of voice) or approached to (e.g. through the perceptions verbalised) with varying sentiments that demonstrate how much each of them aligns or resonates with the higher level sensemaking approach.

First-order codes	Second-order categories	Themes
Openness towards a broader adoption Openness towards AI implementation and use AI embedded in organisational culture Commitment to stay ahead	Forward-thinking and long-term value recognition	Vision
Awareness of AI benefits Need for AI	Recognising AI potential	
Stimulating adoption at all levels Willingness to learn how to use AI properly Creating internal AI-tools and or dedicated teams or functions Experimenting with AI use Externalise AI use Generational turnover Combining different AI tools Gradual implementation	Practical effort	
Degree of structuring of SDM Degree of efficiency of SDM Attachment to long-standing habits Tendency to rely on instinct and impulse Necessity led vs opportunity led proactive decision making	Strategic decision-making flexibility	
Curiosity Enthusiasm Openness toward accepting different views Resistance to trust external views (AI or consultant) Personal culture and mindset	Mindset	Personal adaptability
Approach toward innovation Courage Digital literacy	Behaviour	
Training and exploiting the output Interacting and asking the right questions Confirmation Awareness of AI limitations in support of human intelligence Awareness of AI fallacy	Confidence	Praxis
AI as a habit Using AI naturally Embeddedness in personal life	Routines	
Quality of input data Data availability Data security	Input concerns	Reluctance
AI can miss contextual information AI insights are too generic AI is not precise AI lacks knowledge coming from human relationships Trust	Output robustness concerns	
Fear of AI hallucinations Fear to be overwhelmed Generalised aversion and fear	Fears	

Table 2: Coding structure

First-order codes	Second-order categories	Themes
Human control Black box		
Compatibility of AI with IRP and other existing tools Targetisation of AI solutions Cost Regulation	AI infrastructure	AI accessibility
Targeted training Guidelines Availability of credible success cases	AI exploitation	
Increased confidence in DM Increased consistency in strategic DM Increased objectivity in DM Increased precision in DM Increased rationality of DM Increased reliability of DM Increased clarity in DM More structured DM	Robustness	Decision-making quality
Challenge limited human experience Challenge human conformism Push to risk	Risk and experimentation	
Multicriteria analysis Balancing different decisions simultaneously Minimising errors Combining sources	Managing complexity	
Effort optimisation Increased efficiency of operational processes Better balance in time usage Time savings	Efficacy	
Evaluate alternatives Simulation Knowledge intelligibility Communication	Knowledge deployment	Knowledge management
Explore possibilities Opportunity identification Prediction	Knowledge discovery	
Research and market scoping Synthesise and map Trigger human creativity AI help navigate data for strategic decision Find evidence Human intelligence corrects and verifies Starting point to delve deep Stimulate future learning	Knowledge creation	

Findings.

Cognitive mechanisms that shape strategic decision-makers' sensemaking approaches toward AI

1) Vision

Strategic decision-makers may embody different degrees of vision when it comes to adopting AI in their organisation, in particular at a strategic level, locating themselves on different points of a spectrum that ranges from farsightedness to myopia.

Managers that appear to be visionary and farsighted in relation to AI, declare or show to adopt forward-thinking approaches in realising the value AI can bring in the long run to their decision-making. Consistently they show to be aware of AI potential and declare to have invested in it, even stimulating its adoption at lower levels within the organisation. In some cases, even some of the "visionaries" initially declare they don't use AI for strategic purposes. Then, as the interview unfolds, they realise and declare that they indirectly or directly use it to support some strategic decisions. There might still be lack of awareness in this sense.

The actions through which this vision takes place may include the effort in making individual and unstructured experimentations, or by externalising analysis based on AI in order to test its usefulness, so that its future internalisation can be smoother, having already practically appreciated its power and potential.

The strength of the vision is also impacted by the degree of flexibility of the decision-making process. The more structured and efficient it is, the more likely it for strategist to be open toward AI, in line with an opportunity-led and proactive decision-making approach and with the recognition of human instinct and impulse limitations.

A weaker vision in this sense characterises individuals who argue that they don't see the value of AI to improve their strategic decisions, or that they believe it is not a necessary in their specific industry.

On the opposite side of the spectrum there is what we refer to as a myopic view. This is instead expressed by those individuals who limitedly recognise AI potential and are aware of its benefits. This is expressed by the lack of practical efforts to embrace AI or a limited effort in embracing just to perform operational tasks. This view is more likely to emerge within organisations characterised by a centralised and unstructured decision-making process, with strategist that tend to over-rely on their instinct, in more traditional industries where the need to stay ahead in competition is perceived as weaker.

2) Personal adaptability

Strategist as individuals may show different degrees of adaptability, depending on the mindset characterising them, in terms of general curiosity and enthusiasm toward technological advancements, as well as an openness in accepting recommendations that may contrast their view (e.g. from hired consultants or lower-level collaborators). The type of mindset is then reflected by a behaviour that leads to embrace innovation and/or to endeavour to improve in digital literacy, whose lack may be largely responsible for a myopic vision.

3) Praxis

The way in which strategists make sense of AI is hugely impacted by the degree of routinisation in AI use and the consequent confidence developed. Some managers (mainly younger managers, some of which operating in digital industries) may show a greater confidence in interacting with AI in terms of what to ask and how to exploit the outputs as well as in terms of awareness of AI limitations and fallacy, and this may be linked to a higher degree of embeddedness of AI both in work and in personal life, that makes AI a habit and leads to using if naturally and with familiarity. This routinisation of AI use that makes it a praxis is strongly linked to the sensemaking approach of AI as a peer advisor.

4) Reluctance

Reluctance toward AI is mainly driven by concerns decision makers may have on both AI input data and output insights, as well as by their fear of reduced human control, AI hallucinations (among others). The degree of these concerns and fears determine the emergence of a different sensemaking approach. Typically, we found that they are stronger in managers of a previous generation, who are not native with this technology and maintain a certain degree of scepticisms, despite clearly recognising AI potential in their strategic decision-making tasks.

5) AI accessibility

How accessible AI is perceived is determinant in shaping the sensemaking approach. From an infrastructural point of view, accessibility depends on the availability of AI tools that turn out to be suitable for the company's needs in terms of compatibility with existing technological infrastructure, as well as in terms of degree of targetisation to the strategic goals to perceive. A key role is also played by the perception of cost (for many decision makers who increasingly rely on generative AI, the cost is perceived as non-prohibitive, while other decision-makers who aim to implement targeted AI solutions to process massive amounts of internal data, which should be highly targeted, the cost is perceived as a barrier). AI is also accessible depending on how trained the manager is to properly interact with it and how much he can be inspired by successful cases of AI use at strategic level, as well as on the degree of regulation (which for someone is still too weak, while others fear an excess of regulation in the near future).

6) Decision-making quality

The perception of benefits of AI in terms of increased decision-making quality is highly relevant. Such advantages are mainly linked to effects that are observed at an individual level. The decision-maker is therefore empowered in terms of increased robustness, increased propensity to risk (because of AI confirmation or because of AI creative suggestions), he is more capable of managing complexity and also more effective in balancing time and effort for the purpose of decision-making.

7) Knowledge management

AI also empowers the strategic decision-maker in its ability to manage knowledge, both its pre-existing knowledge, the hidden knowledge and the new knowledge he can create to support strategic decisions. This happens thanks to an improved understanding of available alternatives among which he is called to decide, a stronger tendency to explore even unexpected possibilities through knowledge discovery mechanisms supported by AI, and eventually thanks to an enhanced knowledge creation mechanisms that benefits from triggers to human creativity, as well as from empowered capability to research and map knowledge on which new knowledge can be built.

There is a link between the above described mechanisms. For example, those who show to have strong vision, perceive certain advantages of AI, especially in terms of strategic knowledge creation (P1), and especially in doing it rapidly, which can make the difference in the competition game.

Overarching sensemaking approaches toward AI

The analysis of macro-themes discussed above, distinguishing the sentiment and importance attributed to each of them by participants, we were able to identify the main sensemaking approaches toward AI. In some participants an overlap between different views was observed. For this reason, the approaches identified shouldn't be considered as a rigid categorisation.

AI as a peer advisor

Perceiving AI as a peer, as an advisor entails to make sense of it with a somewhat detached attitude: AI is seen for what it is, It is not overestimated, neither underestimated. Managers with this approach believe it can be of help, up to a certain point. They believe it can augment humans but still strongly put emphasis on the central role of humans and are sceptical on the possibility of AI to replace humans for strategic purposes. As the others, they are aware of AI limitations and fallacy, but this awareness does not lead them to desist from using it. On the contrary, they are enthusiast about using it but with full awareness and control. In particular, it seems typical of younger participants to have AI embedded in their daily life and tend to avoid overrating it. They see it for what it is and consider it as a peer. They are not worried or intimidated, they are restrained by such limitations, simply because they know AI, they are familiar with it, they feel confident in using it, they feel like they know exactly how to handle it and to what degree it can be considered as reliable

"It is a tool that everyone uses anyway, just as if it were their own right arm, so everyone then with their own role in the company, and uses it accordingly for different reasons" (P1).

"I use it absolutely in a friendly manner. I have established a relationship as a work colleague, that is. He is more of a colleague than a machine" (P2).

"Ah it helps me a lot because he is that good co-worker who is always available and does not get impatient and above all follows you" (P6).

"Actually all the time, because whenever I need, both in my private life and in business, to confront someone, I confront the artificial intelligence, but always taking into account the fact that it can make mistakes"(P16).

AI like any other technology

Making sense of AI by comparing it to other technological breakthroughs in human history recognises that AI can support humans in general, and decision makers, while emphasising the need for a deeper integration in it in our lives in order to appreciate its potential. Those who are native with a certain technology will have an advantage over those who need to learn how to interact with it from scratch and overcome a generational barrier.

This approach can be contaminated by the idea of AI as a peer or by the idea of AI as a binoculars.

"No one who I think really uses it regrets it. It is the same principle as with the i-phone or the automatic gearbox: that is, if one unlocks, one uses it. You don't unlock those who either don't have that kind of literacy or are not used to it" (P1)

"I went ahead and stated that it is obviously part of any process of human evolution, of technological evolution, or rather of human evolution through technology" (P9).

AI as humans' binoculars

Making sense of AI as a binoculars for humans, means recognising in it a huge potential, even bigger than those attributed to AI as a peer. This sensemaking approach is often accompanied by a humility in admitting that current experience is limited but there is great curiosity and great expectations based on what experts say and on the current, despite limited, experimentations made. This approach is characterised by huge excitement about AI power and potential, especially by making comparisons with past experiences of tasks that required considerable endeavours.

"But if this mission is augmented by binoculars, by a computer tool, by an artificial intelligence, I broaden my views, I have a range of alternatives, of choices that is certainly superior" (P6).

"It could not be otherwise, given that they are N minds-over 10,000, from what I have read-functioning as if in perfect unison" (P7).

AI as incompatible with strategic needs

This approach incorporates the highest level of resistance towards AI, which is perceived as lacking usefulness and its potential at a strategic level is almost totally neglected. However, this perspective is the least interviewee in our study.

"Because artificial intelligence for me has limitations, because it doesn't speak Italian very well and so we use it for this reason [replying quickly to emails], then for the rest, for the rest, no, because I repeat, if we have to make purchases, for example in logistics and transport - the important investments we make are in transport equipment, so tractors, semi-trailers, vehicles that we allocate to intermodality - it is clear that when we make an investment of this we are talking about millions of euros. I don't think that artificial intelligence can give us a hand in asking for quotes from suppliers who build this equipment" (P13).

Research limitations. *Despite our sample being fairly large and varied, there still remain potential concerns in terms of scope and generalisability of our conclusions.*

Managerial implications. *Our study enhances the understanding of the different way of strategists to perceive and interpret AI and its use for strategic purposes. From a managerial point of view, this could help managers broaden their perspective and push them toward experimenting AI benefits more extensively. Furthermore, some biases or prejudices on AI may be mitigated thanks to an increased awareness of how AI is perceived by other managers. Managers may therefore be pushed to overcoming the reluctance characterising the more sceptical sensemaking approaches, thus finding the motivation to experiment more the benefits of AI pointed out by the braver "visionaries", who have already made experience of the clear benefits of AI in supporting the strategic decision making process.*

Originality of the paper. *Our study sheds light on the main cognitive mechanisms underlying the different sensemaking approaches towards AI, combining all the aspects that characterise existing literature (technological, managerial, or ethical dimensions of AI adoption) under a sensemaking lens that unlocks a new perspective on these aspects.*

Furthermore, novel insights emerge from our study, concerning AI conceptualisation as a praxis, emphasising how it is increasingly embedded in strategic decision-makers personal and organisational routines. This contributes to technology adoption literature (Orlikowski, 2000, Schneider and Leyer, 2019), while evidencing some peculiarities that characterize AI if perceived as a peer advisor.

Additionally, we evidence the micro-level mechanisms through which the support to knowledge management activities is mainly perceived, thereby contributing to the literature on knowledge management processes mediated by technology, in particular by AI (Del Giudice et al., 2023, Jarrahi et al., 2023).

Key words: *sensemaking, technology adoption, strategist, artificial intelligence*

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Artificial Intelligence and The Paradigms of Authenticity in Entrepreneurship: Charting a Research Agenda

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Abstract

In a context characterized by high uncertainty and volatility, such as the one opened up the advent of AI, responding to the paradigm of authenticity and ethical human-centered values becomes ever more important. The paper gets back fundamental thoughts about authentic entrepreneurship and organizations intercepting them with the latest disruptive technologies. An examination on the entrepreneurial domains majorly hit by AI has been brought forward through an in-depth analysis of 55 articles. The areas that are significantly influenced by the most recent changes are: "the journey of self-negotiation", "the pursuit of individual and societal wellbeing", "the re-definition of human-technology interactions in organizational processes", "the challenge of education & training". Authentic entrepreneurs and companies need to provide answers to the changes opened up in these areas and further investigation on how they will and could do that is needed. This is why the paper ends up with a research agenda that aims at stimulating further analyses.

Framing of the research. *Post-modernity, our context, is characterized by fragmentation, uncertainty and dynamism (Lyotard, 2014). Due to such an environment authenticity has established itself as the new paradigm upon which businesses try to position, considering that customers make a major call for it in their essay of getting back some meaning in their shattered lives. It's not a case that academics have given birth to a rich plethora of researches that deal with objective, relational, and individual authenticity. Whereas the first two tend to be more associated with companies and brands, the latter perspective discloses the individual dimension of the entrepreneur (Ranfagni, 2018; Burresi, Ranfagni & Rosati, 2022). A similar player responding to the principles of authenticity emerges as a subject that provides answers to some specific processes. The authentic entrepreneur is someone who brings forward an existential project based on a profound passion and remaining true to himself. In such a journey he tends to display wider interests compared to mere individual wellbeing.*

The idea of authentic entrepreneurship has deep roots in philosophy (Avolio & Gardner, 2005). His ***existential project*** *is a dynamic of personal growth in which past, present and future are enmeshed and the actor, although recognizing its connection to the context and its vicissitudes, is able to continuously re-write his path towards his goals and an envisioned future (Golomb, 1995; Kaufmann, 2016). Such a view can be identified in Sartre ("man is free, man is freedom") and Heidegger's ("project thrown into the world", "poiesis") existentialist perspectives (Kaufmann, 2016; Severino, 1986; Ferrando, 2019). It can be summed up in Kant's idea of getting out from immaturity (Shaw, 2023) or in Aristotle's belief that Men can determine their personality and do not just undergo it (Hühn & Meyer, 2023).*

The journey follows the values, principles, and beliefs of the same leader that has to stick with himself and remain loyal to its principles (Trilling, 2009). Hence, it's not just a path of self-creation, rather also one of self-discovery, since in the essay of ***remaining true to himself*** *and respecting his values, he discovers them at the same time. This can be done through periods of social engagement, since interrelation with others is paramount, but also moments of mindfulness, isolation, and introspection (Akrivou et al., 2011; Kelly, 2023). Apart from a wide set of positive states of mind identified by various authors, such as for example optimism, trust, loyalty, and more (Green et al., 2003; Huy, 1999; Luthans, 2002; Luthans & Avolio, 2003; Lenton et al., 2013) the authentic leader is most of all characterized by self-awareness (the capacity of discerning his emotions and actions), relational transparency (presenting to others one's real self without faking feelings, emotions, and values), balanced processing (the capacity of evaluating all necessary information before formulating decisions), and internalized moral perspective (the leader is guided by his own thoughts and not others' influence)(Walumbwa et al., 2008; Walumbwa, Christensen & Hailey, 2011).*

The two processes of creation and discovery are led by a strong inner ***vocation or calling****, that drives the entrepreneur's approach to work. Such a passion is driving factor for the constant improvement of the leader, who tries*

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to leave his mark pushed by either an inner stimulus of self-realization, or an external sense of duty (Duffy & Dik, 2013).

The three dimensions are strongly interconnected among them. The glue that allows this connection is the last, and fourth, category generally associated to authentic principles, meaning a general attitude of ***care for others****. Once again, ideas related to the topic can historically be found extensively. Levinas optimally represents the thought evidencing that a disposition towards others' wellbeing should be positioned at the center of a meaningful life (Shaw, 2023; Golomb, 1995; Kaufmann, 2016, Dierksmeier, 2013; McPherson, 2013). The contemporary concept that best represents the situation is the one proposed by Freeman and Auster in "Freeman & Auster (2011); Auster & Freeman (2013)". Not casually the idea of poetic self gets back together all what said up to now. A player responding to such a model is someone who forges himself enmeshing past, present, and future in interconnection with others. The communities within which he/she lives are fundamental traits for its own existence and this is why they should require special attention and care (Freeman & Auster, 2011; Auster & Freeman, 2013). Ethical and worthwhile ends should be sought to this purpose (Palmer, 2009; Bishop, 2013).*

However, the influence generated by entrepreneurs respecting the principles of authenticity gets beyond the individual dimension reaching the wider organization. Per extension the ***authentic company*** *respects the criteria previously mentioned for the singular dimension (Shen & Kim, 2012). Freeman & Auster (2015) talk about poetic organization referring to a reality in which the poetic self of each individual is respected, meaning that each subject's existential journey is recognized and value fit within members can be reached only through open discussion about beliefs. It's an organization open to the individuals' capacity of creating, connecting, relating, discussing and sharing (Freeman & Auster, 2015).*

Through these lines an overall picture of what entails being an entrepreneur or company trying to follow the principles of authenticity has been presented. A paramount aspect should be kept into account: authenticity is a process, not a state. This process has to be reinforced and has to find confirmation day by day in each action in order to build it over and over (Erickson, 1995; Helmuth et al. 2023). Hence, it is something dynamic and hard to catch. This is probably the reason why many authors have criticized it (Gardner & McCauley, 2022; Gardner et al, 2021; Alvesson & Einola, 2024).

The question at this point is how will such players deal with the advent of revolution 4.0? Digital technologies, and more specifically artificial intelligence, are re-shaping industries and economic sectors. In the most recent years AI has demonstrated its autopoietic properties in its capacity of evolving autonomously and working as an independent agent impacting significantly the world from which it has been generated (Mikkilineni, 2022). Such a pre-disposition has led to the development of problem solving, adaptation, and generator capabilities that have strongly impacted many sectors (Lee et al., 2019). Competitive landscapes, factors of production, and dynamics of entrepreneurship have been changed too, as well as new decision-making, optimization, and innovation opportunities have been identified (Weng et al, 2024). This new techno economic paradigm has led to changes from manufacturing to engineering (Kim et al., 2022), passing through healthcare, finance, ecommerce, education, and more (Poalelungi, et al., 2023; Dakalbab et al., 2024; Zhang et al., 2021; Gligorea et al., 2023). Objective Intelligence, Uncertainty Management, Complexity Management, Novelty Generation, Low-Cost Modeling and Optimization are all frameworks that have been opened up by the advent of these technologies (Kordon, 2020). Furthermore, as we delve deeper into the implications of AI, it becomes essential to consider the philosophical and scientific reflections on the nature of reality and the paradigm of authenticity. In an era where AI is redefining entrepreneurial dynamics, it is vital to explore how these philosophical insights can inform business practices. A multidisciplinary approach that incorporates reflections on authenticity can provide valuable frameworks for understanding how entrepreneurs can navigate the challenges posed by AI. This not only enriches our understanding of AI but also offers insights into maintaining authenticity in a constantly evolving context (Barbour, 1999). From more operational aspects to discussions on the very essence of humanity, AI is, and will be, the topic of discussion for the next years. This is because we are probably dealing with a new form of intelligence that challenges even our basic assumptions on human society and it is impellent that also entrepreneurs respecting the principles of authenticity take a stand with respect to this new technology. The question is, which will it be?

Purpose of the paper. *The paper aims at understanding which are the impacts generated by AI on entrepreneurs and companies that align with the principles of authenticity. The hypothesis is that authentic leaders and organizations will undergo some specific process while interacting with artificial intelligence. Such dynamics correspond both to the individual dimension of subjects, as well as more collective-based shades. This can be supposed based on the fact that artificial intelligence might be seen as a different form of intelligence, if by intelligence we mean not merely comprehension, rather also the capacity to link concepts and information. The topic of discussion raises many questions about society, humanity, and even intelligence itself. For what concerns the first front, society at large has divided itself in "apocalyptic" and "integrated" (Eco, 1964; Floridi, 2023), meaning that some see AI as a means to disaster, whereas others as a panacea to all sins. The question is what will distinguish humanity from machines in the very next future? Which will be distinctive human qualities and which could be imitated? These are inquiries to which we can provide answer only after having identified the grey areas still not fully understood and that should find further investigation in literature. The research question primarily addressed is therefore this one:*

"Which are the individual and collective dimensions of subjects, especially entrepreneurs responding to the principles of authenticity, that are hit by revolution 4.0?"

Based on such a research statement, the ultimate goal is to develop a research agenda aimed at stimulating further investigation.

Methodology. *To fully understand the relation between authenticity, entrepreneurship, and artificial intelligence a literature review has been undertaken. Academic databases such as Scopus, Web of Science and EBSCO have been used to look up a set of keywords such as "AI", "Authenticity", "entrepreneurship", "machine learning", and their derivatives. After a screening process of title and abstract, the initial research yielded 79 papers debating on the theme. A second, and more detailed, screening process was conducted in order to validate the content within the articles. The process led to the deletion of 24 papers, resulting in 55 academic works deeply analyzed in order to understand current emerging trends, grey sections and key themes that may have responded to the purposes of the present work. Here below a table summarizing the articles and papers analyzed has been reported.*

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* = the article deals with this theme of discussion plus another one; ** = the article deals with this theme of discussion plus two other ones; *** = the article deals with this theme of discussion plus other three ones	

Results. *As said, the ubiquity of AI is leading to major disruptions and innovations at both individual and collective level (Menon, 2024). The analysis of the 55 articles has evidenced that this transition has resulted in major implications in at least four areas of discussion, that have been identified with the processes of: 1) "**the journey of self-negotiation**", 2) "**the pursuit of individual and societal wellbeing**", 3) "**the re-definition of human-technology interactions in organizational processes**", 4) "**the challenge of education & training**".*

Concerning the first one, AI raises many interrogatives about the change that human subjectivity is going to deal with in the next future. In a context in which it becomes ever more difficult to identify what responds to principles of authenticity compared to what is clearly inauthentic, AIs tend to ulteriorly complicate such a situation (Mei & Genet, 2024). This evidences a need for a process of self-negotiation, particularly impellent for those that respond to the paradigm of authenticity. Such a dynamic makes a call for the valorization of the most distinctive qualities a human being possesses and that differentiate it from machines (Todariya, 2024). In their actions, subjects should put particular emphasis on those traits that cannot be replicated by AIs and a synergy between automata and Men should be

established for which each of the two subjects of discussion should do at the maximum extent what they are best capable of (Todariya, 2024; Marino, Cananzi & Aragona, 2024). This means that sentient beings, such as humans, should preserve their human touch, characterized by emotions, sensations, passion, empathy, self-awareness (Kelly, 2023; Knox, Sütterlin & Lugo, 2023; Deptula, Hunter & Johnson-Sheehan, 2025), whereas AIs should be deployed in areas in which humans can be empowered, such as the capacity of analyzing great amounts of data (balanced processing) (Noponen, Auvinen & Sajasalo, 2023). Due to this it is important to understand which areas of subjectivity will be impacted by AIs, which will remain undiscussed, and which will be written from scrap due to the advent of these new powerful technologies. It's a discussion that involves many sides of the individual sphere, from autonomy, spontaneity, and creativity (Werthner et al. 2024; Chesterman, 2020; Giuggioli & Pellegrini, 2023), passing through spatio-temporal and relational dimensions (Barthelmeβ & Furbach, 2023; Giuggioli & Pellegrini, 2023), reaching teleonomy, autopoiesis, indeterminacy, and consciousness (Beerends & Aydin, 2024; Dehaene, Lau & Kouider, 2017).

Regarding the second aspect, the "pursuit of individual and societal wellbeing", on its behalf, puts in direct contact the individual with the collective sphere. AIs have the potential to both improve or mine the wellbeing of individual players and collective entities. On the one hand, there's the danger that people might be shifted away from their actual self and that both companies and subjects would be perceived as less authentic (Cotter, 2019; Gonçalves, et. al., 2025; Jago, 2019; Jago, Carroll & Lin, 2022; Lee & Kim, 2024). On the other, these technologies stimulate a reflection on the responsibilities that players at the apex of society, that may determine collectivities, such as entrepreneurs and companies, have in managing these devices (Deptula, Hunter & Johnson-Sheehan, 2025). One side of the coin highlights the belief that artificial intelligence has the power to give life to a new human renaissance in which creativity and human touch are at the center of the working environment (Giuggioli & Pellegrini, 2023). The second focuses on the very negative implications that might stand out due to a bad management of such devices. It is hence important to grasp that AIs are simply tools in the hands of human agents that on their behalf should take a pro-active role in the management of such tools for the development of a good "AI-society" (Harari, 2024; Cath et al., 2018).

About the third area of discussion, AIs make therefore a higher call for an optimal integration within working environments. Human-AI interaction is something that should be optimized as best as possible. All phases of entrepreneurial activity might be touched by these innovations (Giuggioli & Pellegrini, 2023). It has been reported in literature that AIs have the potential to help in the identification of new business opportunities, improve business practices, reduce uncertainty, introducing new business models and freeing the creative potential of individuals (Knox, Sutterlin & Lugo, 2023; Upadhyay, Upadhyay & Dwivedi, 2022). Apart from more analytical and operational tasks, the question is whether or not AI will be capable of empowering the creative potential of humans (Lee, Park & Hahn, 2023), structuring co-creative systems (Rezwana & Maher, 2023) and fully re-designing company processes (Shepherd & Majchrzak, 2022).

Last but not least, it is paramount to grasp how, and if, entrepreneurs and companies will be capable of developing training programs for both AIs and employees interfacing with these tools, in the essay of directing machines and men towards the values, goals and missions of the company. It's important to train people in order to teach technologies to reach certain ethical values and goals (Noponen, Auvinen & Sajasalo 2023). Only in such a way it would be possible to deal with the agency locus transition that is happening in society (Sundar, 2020). Concerns like, what is ethical, which values are the ones we should teach, etc. are all aspects that now get in the discussion in the effort to lead the transition towards an ideal envisioned future.

From this panoramic view a set of interrelated questions should be further investigated in literature in order to optimally manage the transition happening in society, that is especially important for those players that try to follow the principles of authenticity. Some fundamental ones concerning the process of self-negotiation are:

- *Which traits should an authentic individual, or company, preserve in order to remain true to itself in the era of AI?*
- *On which dimensions of the authentic entrepreneur does AI impact? Does AI primarily impact self-awareness, or does it have significant implications in other domains? If artificial intelligence is an element that can influence the process of self-negotiation, how can the authentic entrepreneur tackle this new challenge?*

Regarding the pursuit of individual and societal wellbeing it is important to understand:

- *In a society in which the same concept of wellbeing might change, what will be the role played by an authentic entrepreneur? Should he become carrier of moral and ethical values? And which are these?*
- *What impact will a technology, capable of establishing new paradigms, have across all layers of society?*

Concerning human-technology interactions in company processes:

- *The possible trade-off between immediate business opportunities stemming from the use of AIs and the loss of authenticity is another field that should be deeply investigated.*
- *What is the limit of dependency from technologies that we should accept? Is there some threshold that should not be crossed?*
- *How should AI be used in entrepreneurial contexts? Should its application be limited to operational tasks, or expanded to additional domains to unleash the creative potential of individuals?*

Finally, on education & training it might be interesting to investigate on:

- *How can the training strategies for employees and the input that we have to provide to machines be designed to ensure ethical and operational alignment with authenticity values? What criteria should guide the selection of data and teaching methodologies to maximize the effectiveness of AI in supporting entrepreneurial authenticity?*

These questions should lead the talk in the next academic future in order to grasp the individual and collective spheres of a kind of entrepreneurship that is driven by authentic principles.

Research limitations. *This paper serves as an initial study aimed at further exploring the individual themes of discussion raised. Due to its broad perspective, two significant limitations have emerged. The first pertains to the investigation strategy. While comprehensive, some notable publications may have been overlooked in the selection process due to filtering criteria. Therefore, further investigation into the identified areas is necessary to encompass all the elements of the discussion. Second, because of its wide scope, the nuances and specialized viewpoints within specific sectors could not be fully integrated, limiting the understanding of particular circumstances. Additional research on these specific sections and their implications is essential. Furthermore, as this is primarily a qualitative analysis of the selected papers, quantitative studies should be conducted to assess potential generalizability. Future observations should also consider the darker aspects of authenticity, particularly the trade-offs inherent in authentic entrepreneurship. Ongoing research across various domains should be pursued, and a multidisciplinary framework is recommended to fully grasp the topic's diverse dimensions.*

Managerial implications. *This paper highlights significant implications for entrepreneurs in the context of an increasingly technology-driven future, where human relationships and values may be compromised by powerful technologies. It is crucial for entrepreneurs, particularly those who advocate for authenticity and prioritize ethical and human values, to adopt a proactive approach in shaping a positive future. Understanding which individual traits should be emphasized and which aspects may be overshadowed by the rise of AI is paramount. The influence of AI extends beyond ethical and moral considerations to operational aspects as well. It is essential to explore how to effectively integrate AI into company processes, not merely to automate basic functions but to enhance the creative potential of individuals. This integration should also encompass the training of both employees and AI systems, ensuring that all stakeholders are aligned and work towards a human-centered, AI-driven society. Moreover, as AI continues to evolve, the challenge lies in maintaining authenticity while leveraging these technologies. Entrepreneurs must navigate the delicate balance between utilizing AI for operational efficiency and preserving the unique human qualities that define their organizations. By fostering a culture that values ethical considerations and human connection, businesses can thrive in an AI-enhanced landscape, ultimately leading to a more authentic and sustainable entrepreneurial environment.*

Originality of the paper. *This paper investigates the intersection of artificial intelligence (AI), authenticity, and entrepreneurship, highlighting the diverse impacts of technology on entrepreneurial contexts. It emphasizes that AI influences not only collective aspects but also the individual and psychological development of entrepreneurs. By addressing the lack of literature examining this triad, the paper fills a significant gap in existing research. Focusing on the entrepreneurial areas most affected by AI, it presents a research agenda that serves as a roadmap for future studies. This agenda encourages scholars to explore how authentic entrepreneurs can navigate the challenges posed by AI while preserving their core values, thus contributing to a deeper understanding of this evolving landscape.*

Key words: *Authenticity; Entrepreneurship; Artificial Intelligence; AI-thenticity; Human-Machine Collaboration; Digital Transformation*

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How to Improve the Quality of Entrepreneurship Education Programs? Managerial Insights from Service Marketing

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Abstract

This illustrative case study provides an opportunity to examine how service marketing principles can be applied to enhance the quality of an Entrepreneurship Education program. By combining literature from Entrepreneurship Education with pillars from Service Marketing literature, the study conceives teaching modules in the context of Entrepreneurship Education as services, therefore aiming to provide an original approach to unveil the elements contributing to the overall service quality. Applying a managerial perspective to educational processes helps describe co-creation of value in Entrepreneurship Education by considering the perspective of both the customer - students - and the service provider - the university. From this viewpoint, insights can emerge into higher education institutions on how to improve the quality of Entrepreneurship Education programs.

Framing of the Research: *The topic of entrepreneurship education is gaining increasing interest among scholars, as evidenced by the high number of published articles, scientific journals, conferences and workshops and other scientific initiatives offered in different parts of the world. At the same time, an increasing number of Entrepreneurship Education (EE) programs are being delivered at different educational levels or outside the school system.*

The increasing focus on EE has been accompanied over time by a shift in the content and objectives of EE programs, as well as in the perspective adopted in studying EE. Early EE research was primarily focused on promoting new venture creation and characterized by a predominantly vocational approach, with educational efforts mainly aimed toward equipping students with the skills necessary to launching a start-up business venture (opportunity recognition, business development, self-employment, and the creation and growth of a business).

As discipline matured, researchers began advocating for an expanded conception of EE that goes beyond mere venture creation and embraces the need to develop students' entrepreneurial mindset. This conceptual evolution represents a significant paradigm shift in EE theory: moving from a "narrow" to a "wide" perspective (Lackeus, 2015).

While the traditional "narrow" approach mainly aims to train future entrepreneurs, providing participants with the necessary skills to start and run a business, in the new "wide" approach to entrepreneurship education the aim is to prepare "entrepreneurial" people, that is individuals capable of tackling problems with an innovative and proactive spirit in different contexts, in the belief that these skills are "relevant to all walks in life" (Lackeus, 2015:6). Accordingly, emphasis is placed on developing in participants qualities such as personal development, creativity, autonomy, initiative and action orientation. Current literature increasingly acknowledges the psychological components of entrepreneurship as crucial. For instance, Shabbir and colleagues (2022) highlight a detachment from purely methodological instruction toward personal developmental outcomes - specifically intentions, motivational factors, and mindset cultivation. At the same time, Tiberius and Weyland (2023) categorize modern EE research into two principal domains: psychological dimensions (encompassing attitudes, motivational factors, and determination) and quantifiable entrepreneurial metrics (including behavioral patterns, skill acquisition, and enterprise establishment).

This rethinking of the EE concept has also been accompanied by a broad reconsideration of the other fundamental dimensions of EE - not only "what" content should be delivered, but also "why" entrepreneurship matters, "how" it should be taught, and "who" should convey such information (Fayolle, 2013).

Within this wide EE perspective, the "how" dimension has gained prominence (Baggen et al., 2022; Nikou et al., 2023). Indeed, untangling how to effectively develop EE programs holds relevance in today's rapidly evolving environment, characterized by unprecedented change and dynamicity and therefore calls for constant educational assessment.

Looking at how to develop EE programs also poses questions about how to manage relationships within this context, as the relational aspects of an educational program can significantly affect its efficacy and how it is perceived by students.

The importance of relatedness as a major factor in influencing the efficacy of an educational program, how it is perceived by students and their intrinsic motivation is clearly revealed by the Self-Determination Theory (SDT). This theoretical model, conceptualized by Ryan and Deci (2000), unveils that the ability of a teaching program to stimulate students' autonomy, competence and relatedness can significantly trigger students' motivation and inspire engaging

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behaviors toward the educational initiative (e.g., Lu et al., 2023; Lavigne et al., 2007; Reeve, 2002). Here, relatedness refers to the human need to feel connected to others, to care for and be cared for by others, and to have a sense of belonging with individuals and the community (Deci & Ryan, 2002). In an education context, relatedness encompasses the quality of interactions between student-educator and student-student within the educational environment. Its importance is multifaceted. First, it contributes to students' intrinsic motivation to engage in entrepreneurial learning, as it satisfies a fundamental psychological need. Second, it facilitates the social learning processes that are essential for developing entrepreneurial competencies. Third, it creates a supportive environment where students feel comfortable taking risks and expressing creative ideas - key aspects of entrepreneurial behavior.

With regard to EE studies, the topic of relatedness and its influence with respect to the quality and effectiveness of education programs has been rarely investigated, although, when the how of EE is addressed, understanding how relatedness can affect students' satisfaction and active participation, as well as the overall effectiveness of EE programs, is paramount.

The focus on relatedness aligns well with service marketing literature, which emphasizes the importance of interactions between service providers and customers, as well as among customers themselves, in determining service quality and customer satisfaction (Wilson et al., 2021). By conceptualizing students as customers of the educational service provided by universities, service marketing principles can be applied to enhance the quality of EE programs. Service marketing literature, indeed, provides a set of concepts and tools to describe the intrinsic characteristics of an EE program, which can be conceived as a service.

While EE literature proposes various suggestions for improving educational programs, these suggestions are mostly developed from the perspective of the service user (the student), through metrics and analytical tools based on evaluating the entrepreneurial mindset that students achieve after training or the concrete results they develop. However, there seems to be a lack of a managerial perspective in evaluating EE programs, which could help focus on crucial aspects of today's education needs such as flexibility or customization to guarantee elevated service quality. Adding the perspective of the service provider (the university) could reveal additional insights into how to structure an EE program, considering that it represents a service delivery process where the quality is determined by achieving satisfaction for both parties involved (students and university). Service marketing literature entails different theoretical foundations and models that potentially help in analyzing EE programs from a service-based viewpoint. Among them, the concept of "interactive marketing" - i.e., the type of real-time marketing happening during service delivery - and the model of "augmented service offering" developed by Grönroos (2009) and deepened by Wilson et al. (2021) are particularly interesting since they put customers at the center of service conceptualization and supply, therefore preserving a focus on EE students. Additionally, Zeithaml et al. (2012) help understand how to conduct training at the service process level, where the key element is the functional quality of the service process more than the technical quality and content of the service itself. Similarly, the "7Ps of service marketing" model (Grönroos, 1997; Zeithaml et al., 2012) expands the traditional marketing mix to include people, physical evidence, and processes beyond the classic four pillars of operational marketing mix (product, price, place, and promotion) - all critical elements in educational services. In substance, there are reasons to believe that adopting a service marketing perspective holds potential value to increase the overall quality of EE programs by providing benefits for both students (as customers) and universities (as service providers). For universities, this perspective can help create value by increasing student engagement and satisfaction, implementing complementary post-program services, and optimizing resources allocation. For students, the benefits include an enriched educational process, revised and optimized to encourage participation and interaction.

Purpose of the Paper: *Given these considerations, this paper represents a first attempt to introduce the combination of two complementary perspectives - the pedagogical perspective related to educational aspects and the managerial perspective related to service aspects - to understand if and how such combination can support a process of improvement in the overall quality of EE programs.*

Potentially, Service Marketing tools constitute a valid means of evaluation of educational programs, ensuring an objective and structured approach. The theme of how to evaluate the effectiveness of EE programs is indeed an ongoing debate in education literature. Following the narrow approach to EE, assessment methods measure entrepreneurial intentions and business creation outcomes. However, in a wide perspective, such metrics prove inadequate for evaluating the development of entrepreneurial competencies. A reason is that entrepreneurial mindset is the focus in the wide EE approach, whose emergence becomes evident only in the long run (Loi & Fayolle, 2021). Fayolle and Gailly (2015) stress how EE benefits often emerge gradually, requiring longitudinal assessment approaches. As Nabi et al. (2017) point out, many of the available evaluations rely on short-term indicators, potentially missing crucial long-term impacts. The need to assess new practices to evaluate EE programs effectiveness is evident: a universal performance evaluation process is still lacking (Tiberius & Weyland, 2023; Fayolle & Gailly, 2015; Daspit et al., 2023).

With an experimental attitude, we propose adopting a Service Marketing lens and focusing this investigation on relationships that unfold within an entrepreneurship education program. On the one hand, this is in line with the SDT, that emphasizes the importance of relatedness as one of the three key dimensions, along with autonomy and competence, that determines students' motivation to participate in EE programs. On the other hand, Service Marketing principles underline how value in services is co-created during the provider-customer interaction, i.e., in a relationship. The idea is to apply a Service Marketing lens as an analytical tool to observe EE programs and identify crucial aspects of the service delivery process, in order to develop strategies and coping practices accordingly.

The intent of this study is to propose a transition in the perspective adopted to design EE programs: from a purely pedagogical approach to a more managerial one - linking the evolution of pedagogy and service marketing in a complementary and integrative perspective, therefore generating a multi-disciplinary reflection. We believe that a fresh and managerial approach to EE could contribute to enriching the research topic with novel insights and contribute to identifying areas of improvement in terms of service process design, delivery, and evaluation. Therefore, the following research questions are addressed:

What insights can emerge from the combination of educational and managerial approaches in the study of EE programs in the context of higher education? How can a service marketing approach contribute to enhancing EE programs' quality and evaluation process?

Methodology: *This research employs a case study approach, focusing on Uniurb Lab, an EE project developed by the University of Urbino. The case study methodology allows for an in-depth examination of the program's structure, implementation, and outcomes, providing rich contextual data for analysis (Dubois & Araujo, 2004).*

Uniurb Lab is an optional program open to students from the University of Urbino from the first year of undergraduate studies to the last year of doctorate - regardless of course and subjects of study - that aims to stimulate the development of an entrepreneurial spirit in participants. The program takes place annually for the duration of a semester and in 2025 reaches its ninth edition. The maximum number of participating students is 30; each year, classes consist of approximately 20 students from varied backgrounds (students of sports science, psychology, literature, foreign languages, economics, education sciences, nutrition sciences, computer science, etc.).

The course is divided into training modules delivered on a weekly basis and follows a predefined scheme. The first module is called "Exploration". This is the opening moment of the laboratory, in which the potential of the participants is explored to obtain even greater motivation and awareness. "Self-empowerment" is the second module, focused on the transversal skills (soft skills) of the participants. The purpose is to allow them to acquire a greater knowledge of themselves and their skills, in order to be able to implement a process of self-assessment of their entrepreneurial aptitudes. The third module is named "Team building". This is the moment when, based on skills and inclinations, teams are formed that will work together in the following part of the course to elaborate the business idea and start an initial phase of project development. In the fourth module, "Idea generation", participants are stimulated to formulate and propose entrepreneurial ideas, which will be developed in the subsequent phases of the course. This phase is carried out starting from the identification of latent or partially/totally unsatisfied needs, to which profit opportunities are associated to be exploited through entrepreneurial ideas aimed at their satisfaction. "Idea validation" is the name of the fifth module, where participants are offered a series of meetings in which the theory and application of the Lean Startup method are addressed. This is an innovative approach to the realization of an entrepreneurial project, which allows reducing implementation times as well as costs and probabilities of failure. It is an approach based on constant iteration between potential customers/users and the proposer, from the early stages of product/service development, based on a minimum viable product (e.g., simplified version of the product/service). This approach allows the implementation of a learning process and continuous improvement (validated learning process) based on feedback received from potential users/customers of the new product/service (for example contacted via telephone interviews or other means). In this phase, participants work in teams, built to maximize the advantages deriving from the contamination between different skills and backgrounds. Finally, the last module is called "What's next?". In this phase, participants meet actors, located in the territory, who can guide the subsequent development of entrepreneurial projects after the end of Uniurb Lab. In particular, meetings are planned with entrepreneurs and startuppers, some fully established, others still in the initial phase of the business, in order to allow participants to interact with young entrepreneurs who have been able to enhance their idea and bring it to market successfully. Visits are also planned to some structures present in the territory, created to support entrepreneurial initiatives and offer training, contamination and networking: certified incubators of innovative companies, coworking spaces, innovation hubs, etc.

In line with a wide perspective on EE, the main purpose of this program is not to generate new businesses or transform students into entrepreneurs, but to ensure that they can build entrepreneurial skills, and a mindset oriented towards entrepreneurship to be applied across different areas of their lives - not exclusively and not necessarily only in the creation of new businesses.

The present article introduces the Uniurb Lab case in a preliminary and illustrative way, considering that data collection and analysis are still ongoing. The Uniurb Lab will be adopted as the main unit of analysis in this research, on which to test the application of a widespread Service Marketing tool, the Service Blueprint (Shostack, 1984). This managerial model encompasses a visual tool used to systematically map service processes, capturing customer actions, frontstage and backstage interactions, and support systems. Widely applied in service design and management, the Service Blueprint helps organizations analyze and improve customer experience and operational efficiency (Bitner et al., 2008). Therefore, it can be considered as a valid analytical instrument to evaluate the Uniurb Lab program and identify potential areas for improvement.

The research design resides in the adoption of the Uniurb Lab case as the main unit of analysis, selected based on the following three criteria: i) it is a well-established EE program where the service design process is consolidated over more than eight years of activity; ii) the program modules follow the directions of the EntreComp model developed by the European Union, therefore allowing for comparison with similar programs in other countries or educational contexts;

iii) researchers have access not only to each lesson of the program, but also to the pre- and post-delivery phases, including service design and evaluation.

Data collection is based on qualitative approaches and on a combination of primary and secondary data sources. Primary data sources include: i) participant observation during Uniurb Lab classes; ii) interviews with students attending teaching modules, educators, and others (members of the university administrative staff, tutors and experts, and academics) involved in the design, organization, and management of Uniurb Lab; iii) focus group discussions with students and educators. Secondary data is represented by archival material available from the ongoing edition of Uniurb Lab and the previous ones, such as the recording of motivational interviews made to students during the pre-laboratory selection process.

The collected information will be used to build the Service Blueprint of the Uniurb Lab, which will constitute the main tool for data analysis. Data analysis will, therefore, follow the aforementioned service marketing perspective with a double aim. On the one hand, data analysis will be implemented with the goal of verifying if and how the Service Marketing tool is effective in unveiling the strengths and weaknesses of the Uniurb Lab program. On the other hand, we expect that by adopting a service marketing perspective we will be able to identify potential areas of improvement in the program and therefore delineate strategic actions to redesign the program's features for its future editions.

Results: *As previously mentioned, data collection and analysis are still ongoing; therefore, the results presented below should be considered preliminary and based on general insights drawn from knowledge of the case study and the foundational principles of the adopted theoretical lens, i.e., Service Marketing. The analysis conducted so far reveals insights into the program as a service offering. First, following the framework of service offering proposed by Grönroos (2009), it is possible to understand the layers composing the service and the interactions they entail. In particular, the framework identifies three layers of services including the core service, facilitating services, and supporting services. The core service of Uniurb Lab is the set of teaching modules developed to stimulate an entrepreneurial mindset among students, which combines traditional lectures with interactive lessons and gamification. Facilitating services include additional interaction moments that enable the delivery of the core service, such as meetings with established entrepreneurs, visits to incubators or innovative firms, and networking opportunities with local organizations and entrepreneurs. Supporting services include extra interaction moments that enhance the value of the core service without being necessary for its delivery, such as informal meetings with Uniurb Lab tutors or social interaction moments such as informal meals with tutors and educators.*

Second, according to Grönroos (2009) a service offering model must be customer-oriented and include all aspects of a service that customers perceive. The accessibility of the service, the interactions with the service provider, and the customer participation are three fundamental elements that constitute the service process from a management perspective. These elements should be added to the basic elements that constitute a service to form the so-called "augmented service offering". In Uniurb Lab, accessibility is ensured by opening the program to students from all disciplines and levels of study. Interactions occur through weekly modules and team-based activities. Customer participation is high, with students actively engaged in the learning process through team projects and idea development. Interaction, in particular, is a key aspect in service delivery, and it can be of different types. While human interaction between the customer and the service provider is the most prominent one, interaction could also happen between the customer and a self-service technology or between the customer and a retailer. In the case of Uniurb Lab, customers experience a service delivery that includes not only the content delivered in each module but also a series of interactions between students and instructors or among students themselves, and the overall learning environment. Therefore, interactions are deep and direct between students and service providers. Mapping all the interaction moments within a service delivery is crucial to recognize what Zeithaml et al. (2012) define as the "moments of truth". It is on these occasions that customers receive an instant impression of the quality of service provided by the organization; each contributes to the overall satisfaction of the customer and their willingness to turn to that provider again. In Uniurb Lab, these moments of truth occur during each module, with particular emphasis on team formation, idea generation, and interactions with external stakeholders.

Third, a key insight from service marketing literature that applies to Uniurb Lab is the role of customers (students) as co-creators of the service experience. As Zeithaml et al. (2012) observe, in the provision of service, that is, actions or performances - usually produced and consumed at the same time, customer participation is somehow inevitable. In many cases, employees, customers, and other subjects present in the service environment interact to produce the service itself. In Uniurb Lab, this aspect appears to be particularly relevant, since students are not passive recipients of knowledge but active participants in the learning process. They contribute to the service experience in various ways. For instance, they contribute with new resources in the sense that students bring their diverse backgrounds, knowledge, and perspectives to the program, enriching the learning environment for all participants. Through their engagement in team activities and idea development, students also directly influence the quality of the educational experience, therefore participating in the process of service quality co-creation. Finally, in some cases students could serve as mentors: in teamwork, more experienced students may take on mentorship roles for others, enhancing the overall learning experience. Customers showing a mentorship role can have very positive effects on the perceived quality of the service and they tend to increase loyalty, as well as supporting satisfaction of all other customers (Zeithaml et al., 2012).

Finally, the analysis of Uniurb Lab through a service marketing lens highlights opportunities for enhancing service design and customization. While the program has a structured format, there is potential for greater customization to meet the diverse needs and backgrounds of students. Service marketing literature emphasizes the importance of service flexibility and adaptability to customer needs. As Zeithaml et al. (2012) note, not all customers have the same desire for participation, and different options can therefore be offered for various market segments that include higher or lower levels of involvement. In the context of Uniurb Lab, this could involve offering different tracks or optional components based on students' prior experience with entrepreneurship, their specific interests, or their disciplinary backgrounds. This approach would align with Fayolle and Gailly's (2015) suggestion that differentiated programs tailored to specific student profiles could be considered.

Research Limitations: *This study presents some limitations that should be acknowledged - even though it should be noted that the work is still in progress, and it is currently shaped in a preliminary form. First, it is based on a single case study, which limits the generalizability of the findings to other EE programs in different contexts. While Uniurb Lab provides valuable insights, multiple case studies across different institutions and cultural contexts would provide a more comprehensive understanding of how service marketing principles can enhance EE. Second, the study focuses primarily on the design and delivery of the EE program rather than measuring its outcomes. As noted in the literature review, evaluating the effectiveness of EE programs remains a significant challenge, and this study does not address this gap directly. Future research should incorporate outcome measures to assess how service marketing-enhanced EE programs impact students' entrepreneurial competencies and mindset. Third, the study adopts a theoretical approach to applying service marketing principles to EE, without empirical validation of the proposed framework. Empirical studies involving surveys, interviews, or focus groups with students and instructors would provide valuable data to validate and refine the framework.*

Managerial Implications: *The integration of service marketing principles into EE programs can entail some managerial implications for universities and other educational institutions offering entrepreneurship training. For instance, viewing EE programs through a service marketing lens enables institutions to design more effective and engaging educational experiences. By considering the core service, facilitating services, and supporting services, program designers can ensure a comprehensive and cohesive offering. To do this, adopting a customer-oriented approach is key. It means recognizing students as customers of the educational service and designing programs that meet their needs and expectations by, for example, conducting regular needs assessments to understand students' expectations and preferences, adapting program content and delivery methods based on student feedback, or offering differentiated service options to accommodate diverse student backgrounds and learning styles.*

Additionally, service marketing emphasizes the importance of interactions between service providers and customers, as well as among customers themselves. For EE programs, this suggests training instructors to facilitate positive and productive interactions with students, designing activities that promote meaningful peer-to-peer interactions, and creating physical and virtual spaces that encourage spontaneous interactions and knowledge sharing. In this perspective, recognizing students as co-creators of the educational experience rather than passive recipients changes how programs are designed and delivered. It therefore becomes essential to involve students in program design and continuous improvement, provide opportunities for students to contribute their knowledge and experiences, and encourage student-led initiatives within the program. Not only, maintaining relationships with students beyond the duration of the program could enhance its long-term impact. In this sense, interesting initiatives could include developing alumni networks to maintain connections with former participants or offering follow-up services to support students in their entrepreneurial journeys.

Finally, even though it was not possible to deploy a specific analysis within the present study, the application of service marketing literature to EE could provide a set of frameworks for measuring and enhancing service quality. Managerial tools such as the ServQual Model or the Service BluePrint model could constitute valid opportunities to highlight the main features, issues, and innovative solutions related to the EE program conceived as a service.

Originality of the Paper: *This paper contributes to the literature on entrepreneurship education in several original ways. First, it bridges two previously separate domains - entrepreneurship education and service marketing - to create an interdisciplinary framework for enhancing EE programs. While EE literature has extensively discussed pedagogical approaches and outcomes, the application of service marketing principles to EE represents a novel contribution. Second, the paper shifts the focus from the traditional emphasis on EE outcomes (such as new venture creation or entrepreneurial intention) to the process of service delivery and the relational aspects of EE. By highlighting the importance of interactions, co-creation, and customer orientation, the paper offers a fresh perspective on how to enhance the quality of EE programs. Third, the paper addresses the ongoing challenge of evaluating EE effectiveness by proposing service quality as an additional dimension for assessment. It complements existing outcome-based measures and provides program administrators with more immediate feedback on program quality. Fourth, the paper emphasizes the dual perspective of both service providers (universities) and service users (students), recognizing that successful EE programs must create value for both parties. This balanced approach is often missing in EE literature, which tends to focus primarily on student outcomes. Finally, by analyzing Uniurb Lab through a service marketing lens, the paper demonstrates the practical applicability of service marketing concepts to EE program design and delivery. This case-based approach provides concrete examples that can guide other institutions in enhancing their EE programs. In summary, looking at Uniurb Lab as a service process allows for generating a more attractive service and contributing to*

the quality of the service itself. This interdisciplinary approach opens new avenues for research and practice in entrepreneurship education, with potential benefits for students, universities, and the broader entrepreneurial ecosystem.

Keywords: *Entrepreneurship Education, Service Marketing, Multi-disciplinary, Higher Education, Case Study, Service Quality*

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Learning and experimentation throughout the pre-entry phase of the entrepreneurial processes

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Abstract

This preliminary study investigates the pre-market-entry phase of entrepreneurship, exploring how team size and composition, in particular the heterogeneity of team members' work experience and field of education, are associated with the gestation activities performed by entrepreneurial teams. We measure these activities by the number of steps teams undertake to validate their entrepreneurial ideas. Analyzing participants' data collected from the application forms of three different editions of an Italian startup business plan competition, we examine the relationship between these steps and team heterogeneity. We also examine how the interaction between team size and heterogeneity correlates with the number of steps. The findings suggest that larger teams with higher diversity in their educational backgrounds engage in more entrepreneurial steps, while work experience is weakly associated with entrepreneurial steps. These insights contribute to research on entrepreneurial learning and team dynamics, highlighting the importance of a detailed examination of how team characteristics shape entrepreneurs' actions during the initial stages of the venture-building process.

Framing of the research. *The wide variation in firms' performance, even within the same sectors, has long puzzled scholars who have focused on the gestational period of new ventures in search for the origin of the key factors of performance. To explain performance heterogeneity, researchers have explored various possible causes, including firms' initial resource endowments (Barney, 1986), the behavioral and cognitive limitations of decision-makers (Gavetti, 2012; Simon, 1979), and the role of uncertainty and expectations in shaping entrepreneurial actions (Camuffo et al., 2024; Felin & Zenger, 2017; Zellweger & Zenger, 2023).*

Recent research highlights that startup survival and performance are primarily "determined by ex-ante heterogeneity rather than persistent ex post shocks" (Sterk et al., 2021, p. 547). Beyond market opportunities and resource endowments, these initial differences largely stem from founders' actions before firm incorporation and market entry (Bennett & Chatterji, 2023; Chen et al., 2018). These actions pertain to specific stages of entrepreneurial endeavors: initiation (e.g., opportunity recognition, intention, entry, and team formation) and engagement (e.g., organizing and learning) (Shepherd et al., 2019). The collection of actions undertaken during this pre-market phase, known as gestation activities (Arenius et al., 2017; Reynolds, 1997), constitute the gestation process (Carter et al., 1996; Hopp & Sonderegger, 2015; Lichtenstein et al., 2007) and can be categorized based on their intended aim or effect (Bennett & Chatterji, 2023; Reynolds, 2006; Reynolds & Curtin, 2008). Some of these actions portray a learning process, that is, an iterative experimental approach to validating the expected profitability of the business idea through practical steps, such as developing business plans, participating in competitions, creating prototypes, gathering customer feedback, and seeking funding. The extent and duration of this validation process are influenced by various factors, including the characteristics of prospective entrepreneurs-e.g., employment status, industry experience, prior entrepreneurial experience, and psychological traits like confidence (Bennett & Chatterji, 2023; Camerer & Lovallo, 1999; Chen et al., 2018; Li et al., 2023; Roelandt et al., 2023).

While prior research has significantly contributed to our understanding of early-stage entrepreneurial activity, we still lack a comprehensive theory that connects the antecedents of the entrepreneurial steps undertaken to validate a business idea (e.g., characteristics of the entrepreneurial team or their resources) with the number and type of entrepreneurial steps (e.g., pivoting, termination of the project, or performance of survived projects) and the consequences of such steps. Indeed, extant research has primarily examined "what" entrepreneurs do, often considering specific activities (e.g., developing a business plan) in isolation rather than adopting a holistic perspective (Müller et al., 2023). The absence of a unifying theoretical framework is underscored by the plethora of different approaches used to identify and categorize entrepreneurial activities (Bennett and Chatterji ,2023; Li et al., 2023; Roelandt et al., 2023).

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To address the limitations highlighted above, this study aims to explore the process through which prospective entrepreneurs learn about the market potential of their business ideas. Specifically, we investigate how team-level characteristics, rather than just individual traits, shape the learning process. Building on research on the effects of team-level heterogeneity on post-entry performance (Bantel & Jackson, 1989; Carpenter, 2002; Hambrick et al., 1996), we propose that team-level heterogeneity is also a significant factor during the gestation phase of entrepreneurial projects.

Purpose of the paper. *Within the three-phase business creation process proposed by Reynolds (2016), we examine how the ex-ante characteristics of the entrepreneurial team relate to the entrepreneurial steps they undertake in both the active nascent and business creation phases, which comprise all activities done before (or close to) incorporation like hiring the first employee or performing the first sale, and that ultimately influence post-entry performance. Specifically, we explore the relationship between the number of entrepreneurial steps and the following team-level characteristics: (1) team size, (2) the educational diversity of team members, and (3) the work experience diversity of team members. Although variables related to team composition have been extensively researched in the past (Williams & O'Reilly, III, 1998), the focus of earlier studies has been mainly on how those characteristics shape performance (Carpenter, 2002; Guzzo & Dickson, 1996; Jin et al., 2017; Naranjo-Gil et al., 2008; Wang et al., 2017), while rarely focusing on how team characteristics affect what the team does. Meanwhile, the literature concerning the gestation activities performed in the pre-entry phase primarily focuses on the individual entrepreneur (Bennett & Chatterji, 2023) rather than the team. Therefore, this study aims to bridge this gap by examining the role of team characteristics in pre-entry gestation activities.*

Methodology. *Much research on entrepreneurial behaviors and actions utilized archival data from the PSED dataset (Müller et al., 2023). PSED-based studies cover nascent activities such as the development of a business plan, the creation of a prototype, the identification of competitors and target markets as well as the formal market entry (Delmar & Shane, 2003; Hopp & Sonderegger, 2015; Kim et al., 2015; Liao et al., 2005; Menzies et al., 2006). These studies concentrate on the overall population of nascent entrepreneurs, which implies a high heterogeneity at the individual level.*

Data used in this study were collected from the application forms filed by entrepreneurial teams that took part in StartCup Lombardia, a prominent business plan competition taking place in Italy. This competition attracts early-stage entrepreneurial teams, including those with startups less than one year old, with at least one member affiliated with a Lombardy university. The data covers the period 2022-2024 and comprises 329 projects and 1129 participants. The use of data on entrepreneurial teams related to academic research allows us to answer the call to investigate the entrepreneurial process in more homogeneous settings (Bennett and Chatterji, 2023).

Table 1 presents descriptive statistics for our study variables. At the individual level (upper part of Table 1), the variable WORK EXPERIENCE indicates that team members have 8.6 years of overall work experience on average.. Moreover, the median value computed for this variable, 5 years, suggests that team members are still inexperienced professionals. We use a set of binary variables to categorize the field of education of participants (e.g., EDUCATION_ENGINEERING, EDUCATION_BUSINESS). In our context, 71.3% of the participants specialize in a STEM discipline, with 40.0% of team members earning a title in Engineering. We also find that 22.0% of individuals were trained in a business-related discipline. This piece of evidence suggests that while a background in STEM disciplines may be necessary to identify entrepreneurial ideas in science or technology-based fields, the availability of managerial competencies in the founding team is important to translate those ideas into an actual startup.

The lower part of Table 1 displays descriptive statistics for team-level variables. We start by considering ENTREPRENEURIAL STEPS, a variable that counts the total number of gestational activities carried out by each team. To construct this variable, we exploited the unstructured data we retrieved from the application forms and the attached documents (presentation decks, resumes, and official documents from the chamber of commerce). To analyze the applications, four independent reviewers extracted text from various fields (e.g., project description, product or solution description, target customers/market, and competitors). These reviewers then analyzed and codified the extracted text to identify the entrepreneurial steps each team undertook before applying to the competition. The set of entrepreneurial steps, adapted from Bennett and Chatterji's (2023) taxonomy, includes 18 distinct actions that can be grouped into the following categories: i) Explicitly identifying the startup's direct and/or indirect competitors; ii) Contacting an external partner with relevant industry experience; iii) Building a prototype or pilot project; iv) Reaching out to potential customers for the product/service being offered; v) Securing funding from non-professional investors. Descriptive statistics for ENTREPRENEURIAL STEPS indicate that teams in our sample carried out an average number of 6.62 steps with a standard deviation of 3.56. The top 10 percent of teams in our sample carried out 11 or more steps.

Tab. 1: Descriptive statistics

	Observations	Mean	Median	Std. Dev.	Minimum	Maximus
			Individual level			
WORK EXPERIENCE	1129	8.569	5.000	9.116	0.000	50.000
EDUCATION_BUSINESS	1129	0.220	0	0.414	0	1
EDUCATION_ENGINEERING	1129	0.400	0	0.490	0	1
EDUCATION_LAW	1129	0.019	0	0.135	0	1
EDUCATION_LITERARY STUDIES	1129	0.049	0	0.215	0	1
EDUCATION_MATHEMATICS	1129	0.019	0	0.138	0	1
EDUCATION_SCIENCE	1129	0.159	0	0.365	0	1
EDUCATION_TECHNOLOGY	1129	0.135	0	0.341	0	1
			Team level			
ENTREPRENEURIAL STEPS	329	6.620	6	3.559	0	16
TEAM SIZE	329	3.432	3.000	1.748	1	10
TEAM SIZE CATEGORY	329	0.416	0.000	0.494	0	1
DIVERSITY WORK EXPERIENCE	329	0.509	0.445	0.469	0.000	2.828
WORK EXPERIENCE HETEROGENEITY	329	0.495	0	0.501	0	1
DIVERSITY EDUCATION	329	0.317	0.444	0.270	0.000	0.800
EDUCATION HETEROGENEITY	329	0.398	0	0.490	0	1

As for the factors associated with the number of entrepreneurial steps undertaken by each group, we focused on the following three antecedents. We considered the number of individuals involved in each group to construct the variable TEAM SIZE. *Descriptive statistics for this variable show that the average team comprises 3.43 people with a standard deviation of 1.75 and a median equal to 3. Starting from this variable, we constructed a two-category variable,* TEAM SIZE CATEGORY *which takes on the value 0 (i.e., small team) if the number of team members is lower or equal to the sample median for the variable* TEAM SIZE, *and the value 1 (i.e., large team) for observations with a value greater than the median.*

The construction of the second variable, WORK EXPERIENCE HETEROGENEITY, *builds on data referring to the variable* DIVERSITY WORK EXPERIENCE. *This latter variable was calculated with the coefficient of variation* $\left(CV = \frac{\sigma}{\mu}\right)$ *using the data from* WORK EXPERIENCE *consolidated at the team level using the relative averages (μ) and standard deviations (σ). The average CV is 0.51-meaning that, on average, the standard deviation of* DIVERSITY WORK EXPERIENCE *is around half the average of the work experience, while the overall standard deviation of the same variable is 0.47. Using the median of the CV (0.45) as a reference point, we construct the binary variable* WORK EXPERIENCE HETEROGENEITY, *which is used to cluster teams into two groups.* WORK EXPERIENCE HETEROGENEITY *is equal to 0 for teams with a computed CV lower or equal to the median (more homogeneous in terms of experience).* WORK EXPERIENCE HETEROGENEITY *is equal to 1 for teams with a coefficient higher than the median (more heterogeneity).*

EDUCATION HETEROGENEITY, *our third variable, derives from* DIVERSITY EDUCATION, *which is calculated with the Gini-Simpson's index of diversity* ($Diversity\ Education_i = 1 - \sum_{i=1}^{R} f_i^2$), *where* $(f)_i$ *are the frequencies of the i-th education field among the seven* EDUCATION *variables.* DIVERSITY EDUCATION *has an average value of 0.32, a standard deviation of 0.27, and a median of 0.44. Moreover, almost 62% of the projects have a value of* DIVERSITY EDUCATION *below 0.5.* EDUCATION HETEROGENEITY *is equal to 1 for values of* DIVERSITY EDUCATION *above 0.44, the sample median (heterogeneous teams) and is equal to 0 for values below the median (homogeneous teams).*

Results. *To illustrate our preliminary results we report two boxplots: one refers to the relationship between* ENTREPRENEURIAL STEPS *and* WORK EXPERIENCE HETEROGENEITY *(Figure 1), and the other the association between* ENTREPRENEURIAL STEPS *and the interaction between* TEAM SIZE CATEGORY *and* EDUCATION HETEROGENEITY *(Figure 2). In the figures, the boxes describe the interquartile range (hereafter, IQR, or the range between the third and the first quartiles), while the upper (lower) bound of the "whiskers" is calculated by taking the largest value of the dataset within 1.5 times the value of the IQR above the third quartile (below the first quartile). The horizontal line is the median, while the cross is the mean. Any dot outside the whiskers are "outliners", i.e., observations with a value of more (less) than the upper (lower) bound.*

Fig. 1: Number of entrepreneurial steps by work experience

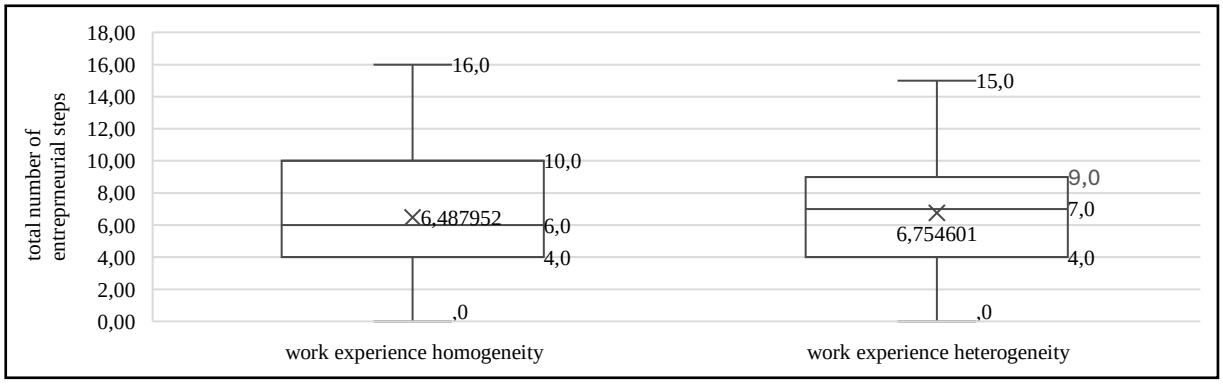
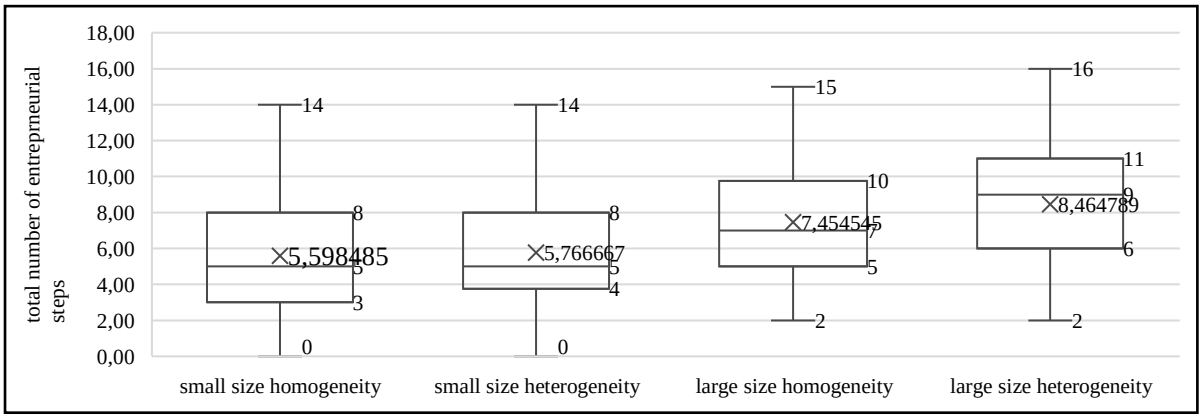


Fig. 2: Number of entrepreneurial steps by team size and field of education



Work experience heterogeneity (Figure 1) is weakly correlated with the average number of steps undertaken by the teams (from 6.49 to 6.76). Looking at the interaction between educational background heterogeneity and team size when considering the number of steps undertaken by the team (Figure 2), the boxplots show that, for larger teams, educational heterogeneity is associated with a unitary increase in the number of steps performed on average-from 7.46 of the homogeneous teams to 8.47 of the heterogeneous teams, an increase of 13.55%. Instead, in smaller teams, an increase in work experience heterogeneity is associated with a 3.02% increase in the average number of steps, from 5.60 to 5.77 steps. We also find that larger, homogeneous teams perform more steps on average compared with smaller, homogeneous teams, from 5.60 to 7.46 steps or a 33.17% increase. The difference between large and small teams is more marked among heterogeneous teams, from 5.77 to 8.47 steps on average or a 46.78% increase. Finally, larger teams always perform at least 2 steps, while some smaller teams (7.16% of teams) perform 1 or less steps.

Research limitations. *Our research is not without limitations. First and foremost, our primary dataset relies on texts and data collected at the time the teams submitted their application to the business plan competition, which we did not oversee. This means that relevant information (such as the timing of steps) was often missing and thus could not be included in our analysis. Moreover, we had to code and interpret the steps undertaken by the entrepreneurial teams from self-reported texts. We tried to limit potential biases and errors in interpretation and coding of the data by assigning this line of work to multiple researchers and cross-checking the outcome of their tasks for (dis)agreements to converge on a common ground.*

There might also be some questions about the context from which we draw our results. The competition was held in the Lombardy region, which is the most prominent Italian region in terms of startup activity, with more than a quarter of the total number of innovative startups (Unioncamere et al., 2024). Moreover, participation was limited to entrepreneurial teams with at least one member affiliated with a university based in the same region, which might limit the generalizability of our results to other startups that do not have connections with a university in the same region or other regions.

Another limitation is that we used general work experience instead of focusing on work experience specific to the economic sector of the entrepreneurial project, which might partially explain why we observe a limited correlation between ENTREPRENEURIAL STEPS *and* WORK EXPERIENCE $_{\text{HETEROGENEITY}}$. *To mitigate this limitation, we are developing two other databases: one on team members' job experience and career, and the other on team members' education. Based on the resumes provided by applicants and their LinkedIn profiles we started to track the educational career of team members-relevant bachelor degrees, master degrees, and PhD degrees and the related institutions, while we are also collecting information about their professional experience by looking at the evolution of their career path, the position and job title, the employer type (if relevant), and the time spent on each position.*

Once the dataset is integrated as reported above, we plan to undertake additional analyses that exploit more advanced statistical tools. On the one hand, we will carry out a cluster analysis on the entrepreneurial steps (i.e., administrative vs. learning steps) to identify recurrent patterns in the types of gestion activities performed by teams with specific characteristics. On the other hand, we will conduct a multivariate regression analysis to examine the association between the variables described in this paper, while controlling for individual traits of the team leader.

Managerial implications. *Our preliminary results suggest that work experience heterogeneity does not translate significantly into more intense testing of the entrepreneurial idea measured by the number of steps carried out by the team. Educational heterogeneity is also weakly correlated with the number of steps. However, the difference between homogenous and heterogenous teams in terms of educational background is substantial in large teams. Thus, team size seems to be the primary driver of the number of steps and interacts with educational background heterogeneity. These findings have an interesting implication for nascent entrepreneurs as they highlight the benefits of taking on board more team members, preferably with a differentiated technical background. We should note that these results could be partly due to the limited average size of the sample projects; a small increase in the number of members in a small-sized team may significantly impact on the division of labor among team members and the ability to test their entrepreneurial idea on a larger scale.*

Originality of the paper. *We contribute to studies that view entrepreneurship as a process and explore how would-be entrepreneurs test the viability of entrepreneurial ideas before startup incorporation or around the time of market entry. More precisely, we provide two contributions. First, we provide further insights on entrepreneurial steps undertaken by future and nascent entrepreneurs by using an original source of information, which comprises a relatively more homogeneous set of individuals, that is, individuals with connections with academic research, as compared with previous studies. For instance, Bennett and Chatterji (2023) collect data on individuals from the general U.S. population; thus, they had to track entrepreneurial intention ex-post (for those who had yet to launch a startup). Instead, our research used data about entrepreneurial teams and individuals that applied for a business plan competition, which implies that they already manifested a clear motivation for entrepreneurship and, in some cases, had started a new firm. Second, we answer the call for more granular and detailed information about nascent entrepreneurial individuals (Bennett & Chatterji, 2023; Li et al., 2023; Roelandt et al., 2023). To the best of our knowledge, previous research mainly used the educational level of entrepreneurs without focusing on how different educational backgrounds impact the gestation process, i.e., the steps undertaken to test the quality of their business idea. Finally, we also address the call of Shepherd et al. (2019) for a deeper understanding of the role of teams' characteristics in entrepreneurial endeavor.*

Key words: *Entrepreneurial steps; Team characteristics; Education background; Work experience; Business plan competition*

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Entrepreneurial Mindset and Cultures: The African context through the lens of an insider perspective

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Abstract

Many scholars have written on the significant impact an entrepreneurial mindset has on entrepreneurship in general. Most of these scholars agree that these mindsets are, however, heavily influenced by the local culture of the people. Adopting a multiple case study approach with an underlying emic perspective involving five indigenous businesses in South Africa, this paper seeks to provide information about how the Ubuntu philosophy influences the mindsets of entrepreneurs in Sub-Saharan Africa. An insider's perspective is used to describe a particular culture in its terms, designed as an emic perspective, and build five case studies of African businesses. The preliminary results highlighted that the entrepreneurial mindset is culture-bound and that some variations between them are due to specific conditions that act as facilitating factors.

Framing of the research. *Entrepreneurial mindset as a key component to successful entrepreneurship has gained significant acceptance within academia and industry over the last couple of years (Kuratko et al., 2020; Jemal, 2020) after remaining an underdeveloped construct for a while (Morris & Tucker, 2021). Various definitions of entrepreneurial mindset (e.g, Daspit et al. 2023; Naumann, 2017) linked it to the cognitive way of thinking and leveraging resources to seek opportunities, especially in circumstances of uncertainty, which is the bedrock of every culture (Della Piana et al., 2024). An entrepreneurial mindset comprises traits such as independence, passion, action orientation, need for achievement, nonconformity, risk acceptance, and little preference for structure (Davis et al., 2016). Identifying factors that stimulate and cultivate entrepreneurial mindsets have intrigued researchers and policymakers in different domains, including management and education, to promote entrepreneurial activities around the world (Pidduck et al., 2023). Researchers acknowledge the value of understanding the concept of entrepreneurial mindset and contextual factors since the mindset depends on sociocultural contexts within which it is embedded (Bayraktar et al., 2022; Ratten, 2020; Pollack et al., 2023).*

Cultural values direct the degree to which communities and societies consider entrepreneurship (Hayton et al, 2002) as the innate elements of every culture is directly related to 'resource mobilizing', 'opportunity seeking', or 'opportunity recognition' and remains a key aspect of the entrepreneurial mindset (Thurik & Dejardin, 2011). However, societal cultures affect how an individual recognizes or evaluates the feasibility of opportunities or the way they realize the need for and prioritize resource allocation (Autio, 2013; McMullen & Shepherd, 2006; Mueller & Thomas, 2001).

Ratten (2020) posits that entrepreneurship is often culturally constructed in terms of how innovative activity is viewed in society and that entrepreneurs construct their identity based on cultural conditions. This also shows how entrepreneurial mindsets may be highly prone to be shaped by cultural values prevalent in societies (Hayton et al., 2002). An entrepreneurial mindset is expected to be culture-bound as mindsets are not fixed but rather evolve along with the individual's interaction with the environment by scanning and interpreting information through the process of entrepreneurial cognition which is heavily influenced by culture (Mathisen & Arnulf, 2013; Pinollos & Reyes, 2011; Rarick & Han, 2015; Li & Liao, 2025), and other life experiences including the sociocultural contexts of entrepreneurs impacts the way they recognise opportunities (Outsios & Kittler, 2018).

SSA and Africa, in general, have a rich cultural history, however, it is inaccessible because it is usually oral and lived rather than written (Nussbaum, 2003), and due to colonialism, much of the written ones are realised from a Western perspective (Murove, 2018). One such rooted philosophy in indigenous African culture is Ubuntu, which translates to humanness (Broodryk, 2005). This is a reference to "humanness in its most intense and natural sense, a genuine human approach to fellow human beings and the environment, including the real world of management and should not be confused with the general philosophy of Western Humanism" (Broodryk, 2005, p.1).

1.1 Entrepreneurial mindset in indigenous African businesses

An entrepreneurial mindset refers to cognitive abilities and behaviours that enable individuals to identify opportunities, take risks, and innovate within uncertain business environments (Daspit and Findley, 2021). In the African

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context, Indigenous entrepreneurship is shaped by unique socio-cultural, economic, and historical factors that differentiate it from Western business models.

One characteristic of indigenous African entrepreneurship is its community-oriented nature, rooted in cultural philosophies such as Ubuntu, which emphasizes collective well-being over individual success (Kupangwa, 2024). Unlike Western entrepreneurial models, indigenous African businesses often function within cooperative networks, leveraging social capital and communal support for sustainability and growth rather than prioritizing profits (Bothello & Weiss, 2025). This collaborative approach fosters trust-based relationships, resource-sharing, and long-term resilience in business operations and opportunity recognition, which is deeply influenced by local knowledge and traditional economic activities. Entrepreneurs often identify gaps in markets by leveraging indigenous knowledge in agriculture, crafts, and trade (Manyaga et al., 2024).

1.2 Ubuntu philosophy and entrepreneurship

Ubuntu is an African philosophy centred on the belief that "I am because we are" emphasizing interconnectedness, mutual respect, and shared prosperity; thus teaching how to "express compassion, reciprocity, dignity, harmony and humanity in the interests of building and maintaining community with justice and mutual caring" (Nussbaum, 2003, p. 2). Ubuntu is lived by most Africans daily whether it is intentional or not, but because it is engrained into the culture of SSA indigens, it has become a constant in the lives of the people, so in this sense Ubuntu can be described as the essence of being African (Broodryk, 2005).

Paramount to Ubuntu is adhering to individuality and communal interactions, which underscores the mutual respect for individual rights while upholding communal shared values, but restricting an overemphasis on personal rights, rather steering all persons towards collective responsibility and shared rights (Adeola, 2024). These values of Ubuntu transcend beyond cultural makeup and also influence entrepreneurship and how businesses are carried out across indigenous African countries (Mabasa, 2020). Businesses operating with Ubuntu values understand the importance of sharing responsibilities, mutual respect and interconnectedness.

1.3 Ubuntu Values

The teachings of Ubuntu have found their way into all spheres of study and daily lives from social work, management and various other fields of studies (e.g. Nussbaum, 2003). Several scholars (Abubakre, et al., 2021; Broodryk, 2002, 2005) identified several pillars of Ubuntu which resonate and interconnect with each other; Adeola (2024) groups these into four main values: collective welfare, humility, reciprocity and benevolence.

1.3.1 Collective welfare

"African societies place strong emphasis on collective welfare, collaboration, interdependence, and shared action and highly value the well-being of the entire group and prioritise mutual understanding and tolerance because of the cultural emphasis on oneness (Adeola, 2024 p.125). This assertion is supported by the score of some SSA countries in the GLOBE Framework with specific regard to the cultural dimension of "ingroup collectivism" defined as "the degree to which individuals express pride, loyalty and cohesiveness in their families or close groups" (House et al., 2004). According to several authors (i.e. Alon et al., 2016, Hsee & Weber, 1999), in a collectivist society, individuals have a safety net which allows them to take higher risk, whereas in some instances in individualistic societies, such a safety net does not exist, making the individuals more risk averse. Thus, it could be argued that the ubuntu value of collective welfare enhances collective action (within the group they belong to) and plays a role in the overall goal of entrepreneurship within indigenous African societies. Twinomurinzi et al. (2010), in their research, found out that when Ubuntu is incorporated into businesses, it reduces inequality and enhances collectivism in South Africa, therefore highlighting the impact of Ubuntu in promoting collectivism in businesses.

1.3.2 Benevolence

In general societies, kindness is seen as a good virtue that defines who a person is and isn't, and kind people stand out in a crowd because they are seen as friendly and well-respected by others (Broodryk, 2005). Benevolence is seen as a moral string of human behaviour that reflects empathy for one another, which goes beyond personal desires, but rather with a society-wide collective outlook (Abubakre et al., 2021).

The level of empathy within a community depicts the level of support given and received from one another. As a society that supports each other (Rabe & Kumswa, 2022), the high empathy levels in Africa could be seen as a good promoter of entrepreneurship drives within the region. Central to the virtue of kindness is the act of giving, which in Ubuntu, promotes resource sharing and caring for each other, shaping the behaviours of people through establishing a societal cohesion in the search of shared objectives (Nussbaum, 2003). In Abubakre et al. (2021), some respondents articulated that their commitment to Ubuntu values gave them joy and a sense of positive contribution when they provided aspiring entrepreneurs with free tools to empower them on the entrepreneurial drive.

1.3.3 Reciprocity

Treating people with respect irrespective of their race, gender, or socioeconomic status is a bedrock of African societies (Adeola, 2024). Ubuntu promotes a sense of shared humanity where all humans are regarded as equal and how

you treat someone will be reciprocated back to you in the same way; therefore, if you show respect to your community members, they will also show you the same respect and vice versa.

When the community assists a member in need, the resources spent to assist the needy member are reciprocated back to the community by other members and vice versa, thus promoting the power dynamics through mutual exchange (Tavernaro-Haidarian,2018). In Hussain et al (2024), the entrepreneur used in the study explained that his company was not just set up for economic purposes but rather to meet the critical needs of the community and this assertion was put to test when the owner was torn between folding up the business or injecting personal resources to keep the business afloat just to retain employees during the Covid 19 era. Injecting personal resources was reciprocated by the employees as now the owner is not involved in the day-to-day running of the business, but the employees are always coming up with new business models, which enabled the business to become self-financing, and the owner receiving daily payments. Drawing from the concepts of Ubuntu, reciprocity can impact the entrepreneurial mindset of entrepreneurs, as businesses would like to produce goods and services as a sort of payback to the society that will benefit all.

1.3.4 Humility

Humility as a virtue is defined by Newstead et al. (2018, p.446) "as a human inclination to feel, think, and act in ways that express moral excellence and contribute to the common good". Humility concerns how individuals regard themselves in the context of how they have treated others. Respect reflects in humility because it is a generally accepted norm that a humble person will respect other people and vice versa (Broodryk, 2005) and manifests itself in the way business activities are carried out. Adeola (2024) explained that Africa's resistance against colonialism could be attributed to the human principles and humanism advocated by Ubuntu, a philosophy which teaches human dignity and respect, signalling a shift from confrontation to reconciliation. This can be considered as a core component of entrepreneurial thinking as humble people are deemed to have an ability to listen and take feedback from business stakeholders, a trait which will determine if one will be a successful entrepreneur or not. Humble entrepreneurs harbour these interrelated traits: accurate self-awareness, an appreciation of others' contributions, openness to feedback, and a transcendent self-concept (Roundy & Lyons, 2022). They are not afraid to surround themselves with people who support his/her strengths and weaknesses, creating a collaborative environment which harnesses the strengths of others to ensure collective improvement in the entrepreneurial drive (Luna, 2022). Someone who isn't humble will find it difficult to accept they have weaknesses and thus will struggle to leverage the strengths of others to hedge against their weaknesses.

Purpose of the paper. *The main purpose of our paper is to analyse the relevance of the Ubuntu values to local entrepreneurship and explore how these values shape entrepreneurial attitudes and behaviours, highlighting potential variations between the five cases of indigenous African businesses from the point of view of African entrepreneurs (inside perspective).*

Methodology. *This study adopts the emic perspective aiming to develop culture-specific concepts (Galperin et al., 2022) related to the entrepreneurial mindset, specifically to understand how the Ubuntu philosophy influences the entrepreneurial mindset of indigenous African businesses using the inside perspective. According to Headland (1990), Kenneth L. Pike was the person who first coined the terms emics and etics in anthropology and linguistics and who first used them in print in 1954 (Pike, 1967). By the 1980s, the terms were being used in unrelated disciplines, including management and IB. An examination of the Academy of Management Journals identifies several papers in the 1990s that discuss emic and etic research issues and focus on which is the "better" approach (Elsbach et al., 1999).*

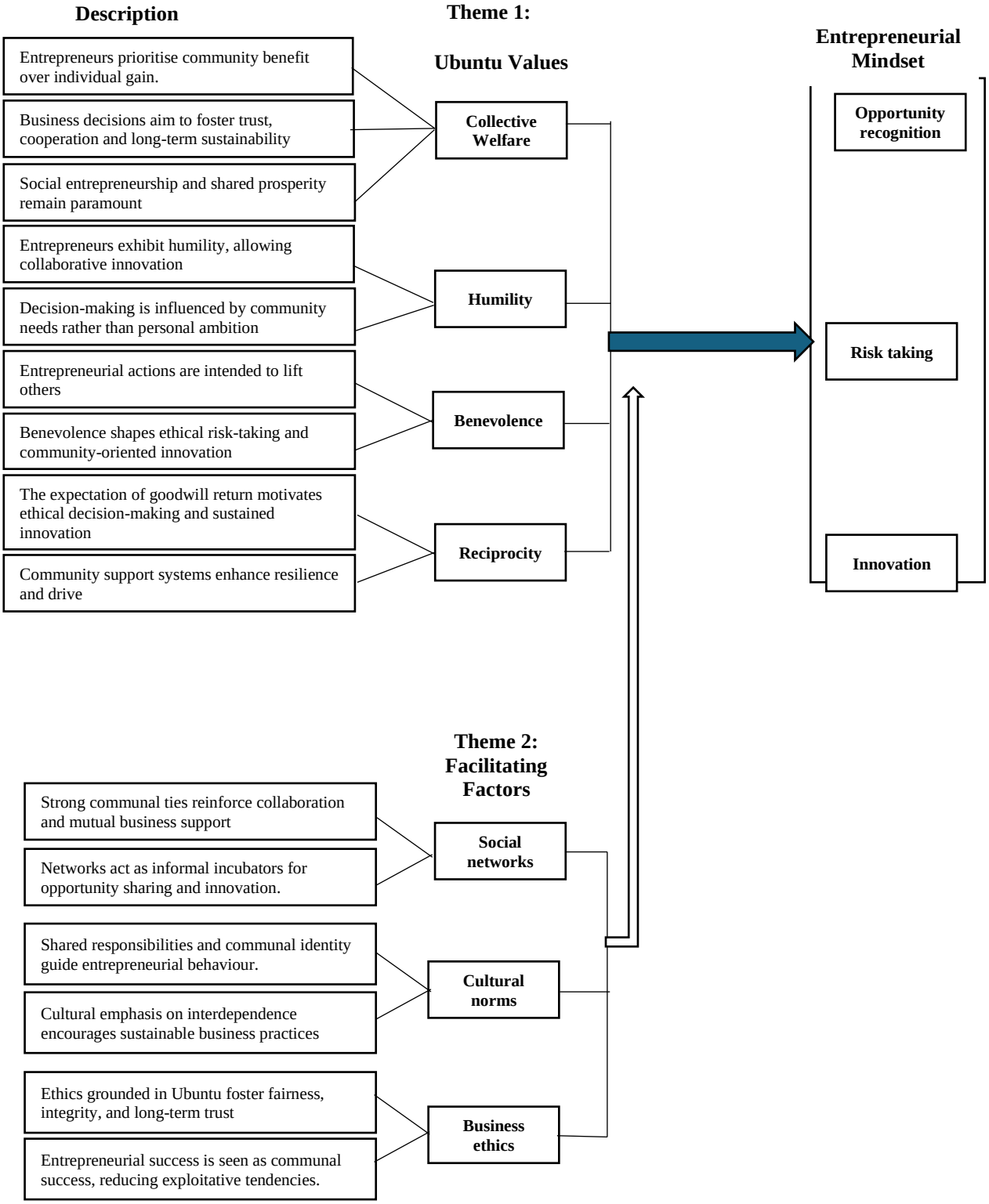
The authors used this approach as it is seen as a valuable method in studying the links between dynamics (Halkias et al., 2022), e.g. between culture - like the social-cultural context shaped by Ubuntu - and entrepreneurship. Since Ubuntu philosophy is a culture-specific phenomenon which is not comparable across other cultures, the most suitable perspective to understand the culture is from a native's point (Lu, 2012); thus, we used the emic approach.

At this stage of our research, we are still analysing the five indigenous businesses in South Africa through their key informants - n. 10 owners, CEOs and their respective representatives - using in-depth semi-structured interviews based on three times. All five businesses were chosen from South Africa, as there was an existing contact in the country that enabled the authors to gather the necessary information. The in-depth semi-structured interviews offered us flexibility and adaptability during the entire data collection period (4 months) while keeping on track with the direction of the research to reach the expected amount of information to complete the case studies (Ruslin et al., 2022). We met respondents virtually twice starting three months ago; the first one (Time 1) started with the first round of the in-depth semi-structured interviews (1 hour and a half each); the second one (Time 2) was devoted to share the information gathered from the first-round interview and refine the interview arguments to use in the last stage (2 hours each). We are currently at the last stage (Time 3), aiming to complete the third-round interviews (we expect 1 hour and a half each) devoted to making reflections together with the key informant of each business about our preliminary results. Each interview was recorded, manually transcribed, coded and analysed individually by identifying common themes within all the Cases. We opted to analyse our data using thematic analysis because it is seen as the most appropriate method of analysis for our research as it has proved useful in entrepreneurial research when examining old and new constructs in entrepreneurship with an undertone of cultural variations (Jones et al., 2011, Gupta and Levenburg, 2010)

Results. *Our preliminary results highlight that the Ubuntu values - collective welfare, humility, benevolence, and reciprocity serve as the philosophical and moral foundation that guides the entrepreneurial mindset in communities*

within SSA. These values prioritise the well-being of the community over individual success. For example, collective welfare drives entrepreneurs to make decisions that benefit their community rather than maximising personal profit, leading to trust, long-term relationships, and sustainable ventures. This echoes Beck and Zwiegelaar's (2024) argument that Ubuntu promotes social innovation for the many rather than personal gain. Also, just like in Hussain et al. (2024), our results depict that entrepreneurs sometimes embrace risk if they are sure of providing products that will ensure communal prosperity. For each value and facilitating factor, we report at least one quote to reinforce the idea about the influence of Ubuntu philosophy on entrepreneurial mindset (Fig.1).

Fig. 1: Analysing the impact of Ubuntu values on entrepreneurial mindsets (Authors' construct)



Following, are two quotes about the conversation we had regarding the relationship between collective welfare and decision-making.

"We decided to take the risk of venturing into this line of business because we realised the filth plastic was causing to our environment and how it was affecting the surrounding communities, the idea of doing this was initially just to help clean the environment. However, we realised we could recycle collected plastics into other products. Now we can pay the communities members per kilo of every plastic they brought to our warehouse using one stone to kill two birds; we helped clean the environment and the people earned some money" (Alpha Case, CEO, 2025, female)

"We source our raw materials locally because we believe in financially independent rural and township communities. We are passionate about our community development" (Delta Case, CEO, 2025, female)

Similarly, *humility*, as a core value, underpins leadership and innovation by encouraging entrepreneurs to be open to feedback and prioritise communal needs. This value is particularly relevant in collaborative ventures and supports inclusive leadership-critical for innovation, as shown in (Saunders, 2022; Metz, 2020; Adeola, 2024).

The subsequent two quotes, derived from our interactions with entrepreneurs, underscore the relationship between humility and its impact on entrepreneurial mindsets concerning innovation and opportunity recognition.

"I am a hands-on businesswoman, so I am ready to get my hands dirty. Some of my workers, one asked why we were not growing our own maize to make the feed for our pigs, I asked myself why I hadn't thought about that? So we ventured into maize growing to help feed our animals, but now we sell maize and soya beans, including our original livestock farming" (Beta Case, CEO, 2025, female).

"Sometimes I hear suggestions from customers, and it might sound crazy, but you're better off listening to them and considering the variation of that product because ultimately, that is what will work or is in demand" (Epsilon Case, CEO, 2025, male)

Reciprocity reinforces a culture of ethical risk-taking. Entrepreneurs often invest in their ventures not only for financial returns but to meet social needs, expecting goodwill and support to be returned by the community. This shared responsibility strengthens social capital, increases resilience, and motivates continuous opportunity recognition and ethical decision-making, echoing the study by the Philanthropy for Active Civic Education (2019). The following quote vividly illustrates how the expectation of community reciprocity, rooted in cultural resonance, can drive significant ethical risk-taking in pursuit of an unmet social need and entrepreneurial opportunity.

"Being a sneaker head myself, I realised there were no sneakers which resonates the South African Culture, I felt this was an untapped field and worth the risk, so I resigned from my well paid white-collar job and decided to start this business. I knew people would patronise the product once it reflected our culture and could be called one of our own" (Gamma Case, CEO, 2025, male)

Benevolence influences entrepreneurs by shaping their ethical risk-taking and driving community-focused innovation. Rather than solely pursuing profit, benevolent entrepreneurs assess risks based on potential social impact, leading them to develop solutions that address community needs. This mindset fosters sustainable, socially responsible innovations that strengthen community ties and contribute to long-term success. This is evident in the words of the CEO in our Delta Case:

"There is not a lot of income in rural communities, especially for women. However, most of these women have family lands undeveloped. As a way of helping to uplift them, we offer them seeds and plants to grow, help them with their farming and then when the produce is ready for harvest, we purchase them for our shops". (Delta Case, CEO,2025, female)

The Ubuntu values are not static but are amplified by facilitating factors - social networks, cultural norms, and business ethics. The assertion that *social networks* serve as vital channels for resource sharing, information exchange, and emotional support, thereby fuelling Ubuntu values in entrepreneurial mindsets, finds strong support in the experience of Gamma Case, CEO. He explains,

"For me, this business has been more than just a personal success.

The support network we have, employees, and the community members, serve as a strong social network which are not just channels for information exchange, but sometimes as emotional support and remain key to our success. Without these networks, it would have been impossible to get to where we are today"

Similarly, cultural norms, grounded in Ubuntu, create an environment where, for example, benevolence and reciprocity are not just virtuous acts but are deeply ingrained social expectations reinforcing shared responsibilities and trust. This was articulated by one of our entrepreneurs,

"In our lives as Africans, one's success is not their own and success is shared, and when we lend a hand, we trust that our communities will return the favour. The spirit of lending a hand and trusting reciprocity is just the way things are. It is woven into the fabric of our culture. We don't just see it as a nice thing to do, but it's what is expected" (Alpha Case, CEO, 2025, female).

Business ethics, grounded in Ubuntu, further promote fairness and integrity, which are vital for building sustainable enterprises. Entrepreneurs guided by Ubuntu understand that their actions have ripple effects throughout the community and that their success is intertwined with the ethical treatment of stakeholders, including employees, customers, suppliers, and the wider community. This inherent sense of responsibility fosters a commitment to fairness in all business dealings. This is reiterated by the CEO of our Epsilon Case:

"We are nothing without our customers, so we always make we remain fair to our customers with all our business decisions..."

The synergy between the Ubuntu values and the facilitating mechanisms shapes the entrepreneurial mindsets of innovation, opportunity recognition and risk taking. Our preliminary findings suggest that Ubuntu values shapes entrepreneurs' mindset on innovation by directing them towards solving communal problems, while shaping their mindsets on opportunity recognition into collective insights and communal feedback. Lastly, entrepreneurial mindsets on risk taking are made feasible by shared communal support and collective benefit, therefore making it essential that risks are taken on with an inner consideration of long-term sustainability and social harmony.

Research limitations. *The research is limited in the scope as we only used businesses in South Africa as part of the research; therefore, generalization could be questioned as Ubuntu is not practiced only in South Africa but in several SSA countries. Therefore, the results of this research will serve as a foundation for future research, where we plan to adopt a multi-sited ethnographic approach to assess the broader impact of Ubuntu on entrepreneurship across Sub-Saharan Africa (SSA). A multi-country analysis will enable us to explore both similarities and differences in how Ubuntu shapes entrepreneurial thinking across diverse contexts. Additionally, this study will examine the role of country-specific cultural factors in shaping the extent to which Ubuntu principles influence entrepreneurial behaviour in the region.*

Managerial implications. *The practice of Ubuntu philosophy into entrepreneurship presents significant managerial implications, particularly in shaping of mindset, decision-making, and business sustainability. Entrepreneurs and business leaders who embrace Ubuntu values-such as collective welfare, reciprocity, humility, and benevolence ethical responsibility-can create enterprises that prioritize shared success over individual gain.*

By leveraging strong social networks, cultural norms and business ethics, entrepreneurs can develop an entrepreneurial mindset that incorporates the values of Ubuntu in the recognition of opportunities, innovation drives, risk taking and making ethical business decisions. Such an integration into entrepreneurial thinking will force entrepreneurs to create businesses that are not only profitable but also socially responsible, resilient and deeply rooted in community-driven success. This, however, begs whether it is possible to be an Ubuntu entrepreneur in locations where some of these facilitating factors are unavailable, for example in individualistic economies which don't have strong social networks and cultural norms.

The managerial implications presented by Ubuntu-inspired entrepreneurship could be viewed as a way of ensuring communal well-being, and thus it is imperative that it is promoted across the continent which could be fostered and strengthened through policy formulations and educational and training frameworks.

At the educational and training levels, Ubuntu could be integrated into schools' curriculum by developing training content that explicitly explores Ubuntu values and their relevance to business decisions and ethical leadership. Educators could also institute simulation activities to help students build understanding of Ubuntu values in general and business lives. This could be done, for example, by implementing simulation-based learning where students negotiate, lead and solve problems in community-centric business scenarios; such an exercise could shape their mindsets as pass through the education system.

Originality of the paper. *Our study addresses contextual factors (Tung and Stahl, 2018) in entrepreneurial research in emerging economies. Following the arguments of Teagarden et al. (2018) and Galperin et al. (2022), highlighting that it is still unclear how models and theories developed in traditional Western contexts are relevant or apply to the under-researched regions, a gap our study tries to fill.*

Key words: *Entrepreneurial mindset; Ubuntu philosophy; Emic; research; African businesses; Culture; Entrepreneurship*

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Building the Foundation: How Dual Team Formation Shapes Early Venture Trajectories

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Abstract

This study investigates how entrepreneurial team (ET) formation approaches-specifically, the intensity of adopting a dual strategy (integrating resource-seeking and interpersonal attraction) influences early entrepreneurial performance. While recent research has begun to explore the dual approach, a significant gap remains in understanding how and why the intensity of adopting this strategy, rather than its mere adoption, affects early entrepreneurial outcomes. Drawing on human capital and homophily theories, the research analyzes 185 entrepreneurial teams participating in a business plan competition, supplemented by interview data. Preliminary findings indicate that a higher intensity of the dual formation approach significantly enhances team productivity, which, in turn, mediates the relationship between team formation intensity and early legitimacy. This research contributes by shifting the focus from singular to dual formation approaches, examining intensity rather than mere adoption, and uncovering the mechanisms through which formation intensity influences early entrepreneurial success.

Framing of the research. *Entrepreneurial team (ET) formation has garnered significant scholarly interest (Knight et al., 2020; Patzelt et al. 2021). This focus is well justified, as most startups are team-based rather than founded by solo entrepreneurs (Beckman et al., 2007), reflecting the crucial role of these teams in shaping the trajectory of an entrepreneur's journey (Cooney, 2005; West, 2007; Kollmann et al., 2016). Despite the prevalence of team-based startups, the process of ET formation remains a significant challenge (Gray et al., 2024a). High failure rates among startups, often attributed to internal conflicts within founding teams (Wasserman, 2012; Genome, 2022), underscore the importance of understanding ET formation approaches-how founders choose co-founders to launch a new venture (Lazar et al., 2020)*

Existing literature identifies two primary approaches to team formation: resource-seeking and interpersonal attraction (Philips et al., 2013). The former emphasizes acquiring complementary skills and expertise to address venture needs (Agarwal & Shah, 2014), while the latter prioritizes familiarity, similarity, and trust among team members, often drawing from existing social networks (Ruef et al., 2003; Aldrich & Kim, 2007). While these approaches are often discussed as two opposing strategies, emerging research suggests that entrepreneurs may combine them as a dual approach (Francis & Sandberg, 2000; Forbes et al., 2006). Recent studies have begun to examine the influence of this dual approach on entrepreneurial outcomes, showing its superiority over single-strategy approaches in enhancing both team effectiveness and startup performance (e.g., Shah et al., 2019; Lazar et al., 2022).

Despite evidence supporting the benefits of this formation strategy, research in this area remains in its early stages (Hawily et al., 2024). Much of the existing literature treats team composition as a given in later stages of venture development, making assumptions about team formation strategies. However, a key drawback of this approach is its ineffectiveness in addressing the interplay between resource-seeking and interpersonal attraction (Agarwal, 2019; Zellmer-Bruhn et al., 2021). Therefore, to deepen our understanding of this issue, it is essential to complement early research on dual formation while offering fresh insights by going beyond its mere adoption and examining the extent to which it is applied. Building on this foundation, we aim to address how and when the intensity of adopting a dual formation approach from the onset can influence early entrepreneurial outcomes.

Purpose of the paper. *Building on the previous foundation, this paper investigates how lead entrepreneurs' decisions regarding co-founder selection from the outset influence early entrepreneurial performance. While ET formation may seem a team-level phenomenon, studies have shown that ETs are often built around a single individual, the lead entrepreneur (Shah et al., 2019). Specifically, this research work seeks to answer the following: how and when does the intensity of adopting a dual formation approach from the outset impact early entrepreneurial outcomes?*

This study complements prior research by focusing on the intensity of the dual formation approach rather than simply its presence or absence. It argues that the degree to which entrepreneurs balance resource needs and interpersonal

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compatibility has significant implications for team productivity and subsequent entrepreneurial outcomes. Drawing on human capital theory (Becker, 1994; Schultz, 1961) and homophily theory (Lazarsfeld & Merton, 1954), the research develops a framework for understanding and measuring the intensity of these combined approaches.

Adopting an input-process-outcome framework, the study examines the relationship between team formation intensity, team productivity, and early entrepreneurial performance. It analyzes data from 185 entrepreneurial teams participating in a prestigious business plan competition, supplemented by insights gathered from in-depth interviews with lead entrepreneurs and their co-founders. By focusing on the nascent stage and examining the intensity of the dual formation approach, this research aims to provide a more nuanced understanding of how team formation influences team processes and entrepreneurial success.

Methodology. *To investigate pre-founding ET formation approaches from inception and their impact on early entrepreneurial performance we relied on a sample of nascent ETs participating in a business plan competition (BPC). The BPC serves as an ideal context for collecting primary data on ETs at the nascent stage. Prior research has effectively utilized BPCs to study entrepreneurial teams in the early phases of venture development (e.g., Foo et al., 2005; Foo, 2011; Lazar et al., 2022).*

The BPC in this study is based in Italy, a country recognized for its entrepreneurial ecosystem, particularly in one of its most entrepreneurial regions (Mazzoni et al., 2022). Organized by a consortium of local stakeholders, including Chambers of Commerce, industrial associations, bank foundations, and universities, this competition has been a prestigious attraction for nascent entrepreneurs in the region for over 20 years.

The competition is held annually without restrictions on the number of applicants or business ideas; the competition is open to teams at the ideation stage or those who have established ventures no older than 12 months. These ventures must not yet have achieved consistent positive cash flow or completed their first sale. This criterion ensures that all participants are genuinely in the nascent stage of entrepreneurship.

To qualify as nascent entrepreneurs, participants must actively engage as founders or co-founders of emerging ventures that have taken measurable steps toward realization. However, ventures must not yet have reached the stage of generating regular positive cash flow, which aligns with definitions from Davidsson and Gordon (2016). This ensures that the study captures entrepreneurial teams at a critical formative stage, allowing for exploring team dynamics and performance during the early phases of venture creation.

In this BPC, nascent ETs go through two main stages. In the first stage, teams participate in the business competition by submitting a description of their entrepreneurial idea; some of them submit a business plan. However, writing a business plan, whether formal or informal, is optional for a team to take place in the PBC. Next, team members are supposed to attend a training course, in which they are asked to submit a first draft of their business plan to be evaluated by the external scientific committee. The committee comprises experts in the field of entrepreneurship (i.e., advisors, business angels, investors, and academics), selects the most promising ideas, and invites the selected team to attend the second stage. Teams continue refining and developing their business ideas in this stage, culminating in an award ceremony recognizing the top-performing teams.

To test our hypotheses, we utilized data from two stages of the business plan competition spanning from 2021 to 2024. In the first stage, we examined the relationship between team formation approach and team performance, focusing on 185 teams. Hypotheses 2, 3, and 5 were tested in the second stage, which involved 108 teams. Below is a detailed description of how we arrived at these final sample sizes.

In the open participation phase (first stage), we collected the list of all participants. Entrepreneurs were asked to provide information about their business ideas, including descriptions and demographic details. At this stage, team leaders were required to fill out the information, though in many cases, other team members contributed and identified the team leader. A total of 525 projects were submitted between 2021 and 2024. We had contact information for all team leaders and some other members, which was obtained through the business plan competition organizers, who assisted in reaching the entrepreneurs. Of the 525 projects, 231 responses were received to our questionnaire, resulting in a response rate of 44%. After reviewing the 231 responses, 19 were from non-lead entrepreneurs. We verified that these responses were consistent with those of the lead entrepreneurs and subsequently excluded them, leaving 212 projects. Of these, 24 were from solo entrepreneurs. Given our focus on team formation, we excluded these and focused on 185 teams, which included 599 members (with 185 team leaders and 411 co-founders).

In the second stage, 80 teams were disqualified from the competition, leaving 108 teams for evaluation by the committee. These teams were assessed for early performance in the context of our study. Thus, for testing hypotheses 2, 3, and 4, we used the data from 108 teams, which included 238 co-founder selection cases.

To ensure comparability between the teams in the first and second stages of the competition, we conducted independent two-sample t-tests to examine differences across four key variables: team formation dual intensity, team formation personal intensity, team formation skill intensity, and the sum of nascent activities. The results showed no statistically significant differences between the dropped teams and those that continued.

To assess the intensity of team formation approaches, we developed a set of questions with 11 attributes that lead entrepreneurs could choose from to describe how they selected their co-founders. Specifically, we asked entrepreneurs to specify how they selected their co-founders using the options provided below while allowing them to write their own responses if they felt the options did not fully capture their selection process. The attributes were grounded in theoretical discussions on team formation and co-founder selection, drawing from the work of Forbes et al. (2006), Aldrich & Kim

(2007), and Lazar et al. (2020), all of which offer valuable theoretical insights into how team formation approaches can be identified.

The attributes we included align with concepts from Human Capital Theory and Homophily as they focus on competencies, experience, and personal ties, which are central to these theories. The attributes asked entrepreneurs to select their co-founders based on the following: complementary competencies (different from those available), experience in creating startups, experience in the industry sector related to the business idea, managerial experience, access to important financial resources, similar competencies to those already available, ties of parenthood or being a couple, full confidence in the person, shared educational background (same school/university), belonging to the same professional network, and enjoyment of working with the person. We also asked entrepreneurs to specify their reasoning, though no formal specification was provided for the competence of these attributes.

We conducted 60 interviews with lead entrepreneurs and their co-founders to validate this approach further. During these interviews, we asked lead entrepreneurs how they selected their co-founders and also inquired of the co-founders about their reasons for being selected. The findings confirmed our approach to measuring team formation. This method represents a novel contribution to team formation measurement, as previous methods have typically relied on text analysis or relationship-based metrics found in written text (Gray et al., 2024; Lazar et al., 2022). Our approach was supported by a theory-driven, grounded method for understanding and measuring team formation based on direct interactions and the practical decisions made by entrepreneurs.

To measure the intensity of team formation approaches, we calculated three variables: personal intensity, skill intensity, and dual intensity. Interpersonal attraction intensity was computed by dividing the number of personal attributes selected by 5. Resource-seeking intensity was calculated by dividing the number of skill attributes selected by 6. Dual approach intensity was the product of personal and skill intensity scores, reflecting the combined influence of both factors in team formation.

The scores range from 0 (no intensity of a specific formation approach) to 1 (maximum intensity). Team formation ranges between 0 and 0.4. For the dual formation approach, 27.1% of teams reported no adoption of this approach, while almost 63% scored between 0.03 and 0.4. The intensity of resource-seeking and interpersonal attraction approaches was higher, with resources seeking with 70.2% scoring between 0.16 and 0.33 and 75.0% of interpersonal attraction scoring between 0.2 and 0.4. Given the nature of the formula, it is typical to observe lower average dual intensity values compared to personal or skill intensity values. Most teams are unlikely to score high on both dimensions simultaneously, and the product reflects this combined moderate emphasis. This is an inherent measurement characteristic and provides insight into how teams balance these two approaches. All the main independent variables were standardized to improve the interpretability of coefficients and ensure comparability among predictors with different scales.

For our model, traditional outcome variables like profitability or firm value were not applicable for two reasons. First, the teams in our sample were in a very early stage, with 89 teams legally registered and 99 not yet registered, representing 53% of our sample. Using financial measures would not only unfairly exclude a large portion of the sample but also be inappropriate for teams at this stage (Davidsson & Gordon, 2016). Second, team performance is not always directly aligned with the financial outcomes of organizations (Mathieu et al., 2008). Research on the link between team composition and productivity suggests that team behavior is a stronger indicator of performance and dynamics than financial outcomes (Beal et al., 2003). Consequently, we focused on team productivity rather than financial outcomes, aligning with recent studies that have successfully adopted this approach to examine team composition and performance in early entrepreneurial teams (e.g., Ko et al., 2022).

To measure productivity, we assessed the number of gestational activities initiated by each team, representing progress toward organizational creation. The PSED was the first to introduce this method, which captures activities to advance venture creation across four dimensions: intentionality, resources, boundary, and exchange. Following this approach, we included 24 activities: selling a product, contacting first customers, purchasing equipment, developing a product, registering a new venture, and others. Each completed activity was assigned a value of 1, while uncompleted activities were scored 0. The total score for these activities provided a measure of the behavioral performance of entrepreneurial teams during the nascent stage. The team performance ranges between 1 and 18, with a mean of 2.27.

We adopted an approach consistent with our team performance evaluation and current entrepreneurship studies to measure early entrepreneurial performance. Selecting a metric that reflected outcomes directly tied to early-stage team production was crucial. Given that the quality of nascent activities indicates entrepreneurial team (ET) competence (Ko et al., 2022), ensuring that the measurement aligned with the nascent context was essential. To achieve this, we utilized committee evaluations of business plans submitted by teams to measure early entrepreneurial outcomes.

The business plans detailed the nascent activities undertaken by the teams, including key aspects such as market segmentation, market size, the level of product or service development (accompanied by detailed descriptions), the presence of trademarks or patents, marketing activities performed, and other relevant actions. This approach aligns fully with our indicator of team performance. Additionally, the business plans included team member CVs and their roles within the project, ensuring alignment with the independent variable of team formation.

The evaluation committee comprised diverse members with backgrounds in entrepreneurship, including serial entrepreneurs, investors, incubator experts, and university professors specializing in entrepreneurship. Each member independently assessed the business idea based on the aforementioned dimensions. The final decision determined whether

a team advanced to the second stage of the competition, with typically 10 to 17 teams progressing. Teams advancing to the final stage were assigned a value of 1, while others received a 0.

This evaluation process has been validated in numerous entrepreneurship studies investigating ET processes and outcomes at the early entrepreneurial stage (Foo et al., 2005; Lazar et al., 2022).

We examined several control variables to address factors influencing entrepreneurial performance. "Age" was included as a proxy for entrepreneurial experience and knowledge, as well as the individual's position in their life cycle, which impacts entrepreneurial behavior. The age of lead entrepreneurs ranged between 18 and 77 years, with a mean of 36.38 years. "Age" was measured as a continuous variable, calculated as the difference between the entrepreneur's birth date and the date of participation in the competition. "Gender" was also controlled for, as prior research indicates performance differences between male and female entrepreneurs, with men often outperforming women in entrepreneurial outcomes. Gender was coded as a dummy variable (1 = female, 0 = male). The majority of lead entrepreneurs are men, marking 77.6% of the sample. Moreover, we control for lead entrepreneurs' "general self-efficacy" that influences the entrepreneurial process at different stages. We measured self-efficacy following the approach of Maurer and Pierce (1998). This involved using items rated on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree" and calculating the average score across all items to determine the overall self-efficacy level. Lastly, at the individual level, we controlled for the number of idea initiators, reflecting additional leadership roles that may influence team performance. Lead entrepreneurs identified team members who originated the idea and recorded it as a count. In the sample, 73% reported one initiator (always the lead entrepreneur), 21% reported two, and 6% reported three or more. "Industry type" was included to account for variations in the resources required and success rates across industries. This variable was coded as 0 for manufacturing and 1 for services. We controlled for "team size", measured as the total number of team members, as larger teams tend to provide greater human resources, which can enhance firm performance. Lastly, we included the "time gap" between the founding of the entrepreneurial idea and participation in the competition. The duration and timing of organizing activities can significantly impact performance, implying that teams that start developing their ideas earlier are likely to have more time to refine their entrepreneurial projects and achieve better performance. This variable was measured using the number of years to capture the impact of this time difference on entrepreneurial outcomes.

Results. *This study investigated the relationship between team formation approaches and early entrepreneurial performance. Three primary hypotheses were tested, focusing on the impact of dual, resource-seeking, and interpersonal attraction formation strategies.*

The first hypothesis posited that the intensity of the dual formation approach (combining resource-seeking and interpersonal attraction) would be positively associated with early-stage entrepreneurial team performance. Regression analysis revealed a significant positive relationship between dual formation intensity and team productivity. Teams exhibiting a higher intensity in balancing skill-based and interpersonal attributes demonstrated better performance in early entrepreneurial activities. This finding supports the hypothesis, suggesting that integrating both resource acquisition and interpersonal compatibility is crucial for early team success. Control variables, including time gap and team size, also significantly influenced team performance.

The second hypothesis proposed that the intensity of the dual formation approach would be positively associated with early entrepreneurial performance. Logistic regression analysis demonstrated a significant positive impact of dual formation intensity on early entrepreneurial performance. Teams with a higher intensity in the dual approach were more likely to achieve positive early outcomes. However, when control variables were introduced, this effect became marginally significant. Other factors, such as the number of idea initiators and leader self-efficacy, emerged as positively associated with early performance, while gender showed a marginally negative effect.

The third hypothesis examined the mediating role of entrepreneurial team performance in the relationship between team formation approaches and early entrepreneurial performance. Following established procedures, mediation analysis revealed that entrepreneurial team performance fully mediated the relationship between dual formation intensity and early entrepreneurial performance. This suggests that the positive effect of dual formation intensity on early entrepreneurial performance is channeled through its positive influence on team productivity. In other words, teams formed with a high intensity in the dual approach achieve better early outcomes because they are more productive.

Additional analyses explored the individual effects of resource-seeking and interpersonal attraction approaches. Resource-seeking intensity significantly and positively affected team performance, although weaker than the dual approach. However, its effect on early entrepreneurial performance was not significant, and the mediation analysis suggested that team performance only partially mediated this relationship. On the other hand, interpersonal attraction intensity showed no significant relationship with either team performance or early entrepreneurial performance, indicating that this approach alone does not significantly influence early outcomes.

In summary, the findings highlight the importance of the dual formation approach for both team productivity and early entrepreneurial performance. The results strongly support the idea that balancing resource acquisition with interpersonal compatibility is a key driver of early entrepreneurial success, and that this effect operates through enhanced team productivity. While resource-seeking can contribute to team performance, it does not translate directly into improved early entrepreneurial outcomes. Interpersonal attraction alone appears to have little impact on either team performance or early success.

Research limitations. *Cross-sectional data limits understanding of the dynamic team formation process. While common in multi-stage analysis, sample size reduction in the second stage could affect robustness. Finally, the Italian context may limit generalizability, suggesting a need for cross-cultural studies.*

Managerial implications. *Unlike other team formations, ET formation offers lead entrepreneurs unique freedom in co-founder selection (Knight et al., 2020), while co-founders also have agency in deciding to join (Huovinen & Pasanen, 2010). This freedom can be a double-edged sword: lead entrepreneurs have the autonomy to choose their partners to grow their ventures, yet finding individuals who balance both skills and interests remains a challenge (Lazar et al., 2022). Previous research has offered suggestions on how to navigate this challenge-either by strategically leveraging qualified individuals within the lead entrepreneur's close circle (Zellmer-Bruhn et al., 2021) or by expanding their networks to seek individuals with complementary skills and actively building relationships with them (Hawily et al., 2024). Accordingly, our recommendation to entrepreneurs regarding whether to exploit existing ties or form new ones to achieve a dual formation strategy is to pursue this approach as intensively as possible. In practical terms, this means selecting potential co-founders based on multiple skill sets and interpersonal attributes. Our study demonstrates that doing so can enhance team productivity and contribute to early entrepreneurial success.*

Originality of the paper. *This study contributes to the ET formation literature by examining the intensity of dual formation approaches-the strategic balance of resource-seeking and interpersonal attraction-and its impact on early entrepreneurial performance. While prior research acknowledges the importance of both skills and interpersonal factors (Francis & Sandberg, 2000; Forbes et al., 2006; Shah et al., 2019), it often treats these approaches as distinct or simply examines their presence rather than the degree to which they are integrated. This study addresses this gap by focusing on the intensity of the dual approach, arguing that the specific balance between these factors significantly influences team dynamics and venture outcomes.*

Our findings offer several key insights. First, the intensity of the dual formation approach is positively associated with both team productivity and early entrepreneurial performance. This underscores the value of strategically combining complementary skills with interpersonal compatibility from the very beginning of the venture. Second, we demonstrate that team productivity mediates the relationship between dual formation intensity and early entrepreneurial performance. This suggests that the benefits of the dual approach are realized through enhanced team functioning and effectiveness. Third, while resource-seeking alone can contribute to team performance, it does not directly translate into improved early entrepreneurial outcomes, highlighting the crucial role of interpersonal factors in early success. Finally, interpersonal attraction alone shows little impact on either team performance or early outcomes, suggesting that while cohesion is important, it must be coupled with the right mix of skills and expertise.

This research makes several important contributions. It advances the ET formation literature by expanding the ET formation-process-outcome model in three distinct ways. First, it shifts the focus from the presence of different formation approaches to the intensity with which they are adopted. Second, it explores the mechanisms through which this intensity influences entrepreneurial outcomes via early team productivity. Third, we examine these nuanced aspects of team dynamics at the nascent stage-a phase often overlooked in this context-yet marked by limited resources and high uncertainty, which influence both current and future entrepreneurial outcomes. Finally, combining survey data with in-depth interviews, our methodological approach provides a rich and robust understanding of the team formation process.

In conclusion, this study emphasizes the strategic importance of the dual formation approach for nascent ventures. By deliberately balancing the acquisition of diverse skills with the cultivation of interpersonal compatibility, lead entrepreneurs can build high-performing teams better positioned to navigate the challenges of early-stage venture development and achieve entrepreneurial success. Our findings offer practical guidance for entrepreneurs seeking to build strong foundations for their ventures, highlighting the critical role of thoughtful and strategic co-founder selection.

Key words: *Entrepreneurial Teams (ETs), Resource-Seeking, Interpersonal Attraction, Dual Formation Approach, Early Entrepreneurial Performance.*

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Development and Retention of Entrepreneurial Competencies: A case study from a management course

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Abstract

This work-in-progress paper explores how the challenge-based learning (CBL) approach impacts university students' entrepreneurial skills development and retention. We adopted a longitudinal case-study approach focusing on a curricular management course on sustainability and social entrepreneurship at the University of Trento. Using the Entrepreneurial Competences Framework (EntreComp), we collected data at three intervals (pre-course, post-course, and 12-month follow-up) to answer two main research questions: RQ1: What entrepreneurial skills do students acquire through a CBL and hands-on course? RQ2: Which skills persist in the long term, and which tend to diminish over time? Findings illustrate significant short-term improvements across all entrepreneurial competencies immediately after the intervention. However, while some skills remained stable at the one-year follow-up, others reverted to the baseline. This paper outlines managerial implications for educators, program designers, and managers. This contribution also highlights methodological limitations and directions for future research.

Framing of the research. *Over the last three decades, higher education institutions (HEIs) have been stimulated to becoming more entrepreneurial, taking initiatives, and starting innovation hubs (Britchenko et Al, 2019; Ashton & Comunian, 2019; Youtie & Shapira, 2008) or entrepreneurship centers (Menzies, 2009), fostering entrepreneurial and innovation (E&I) education (Katz, 2003; Kuratko, 2005), supporting the commercialization of research outcomes, and supporting academic startups and spin-offs (Guerrero et al., 2016). Universities are abandoning the "ivory tower" paradigm to become entrepreneurial universities (Etzkowitz, 1983), seen as "entities offering opportunities, practices, cultures and favourable environments that actively encourage and embrace the entrepreneurship of students and graduates" (Mascarenhas et Al, 2017, p. 317). And they become crucial actors in their local innovation ecosystems (Zhang et al., 2016) in the context of triple and quadruple helix (Gianiodis et al., 2016; Ratten, 2014; Urbano & Guerrero, 2013).*

Entrepreneurial universities offer various E&I education initiatives, such as curricular or extracurricular courses, challenge-based courses, hackathons, entrepreneurship programs (Von Graevenitz, 2010), winter or summer schools dedicated to entrepreneurship and innovation, and start-up labs (Scroccaro & Rossi, 2022). Among these formats, challenge-based learning (CBL) (Nichols & Cator, 2008; Nichols et al, 2016; Pérez-Sánchez et al, 2020; 2023; Vignoli et al, 2021) is gaining momentum worldwide because of many internal and external factors (Perna et Al, 2023; Vilalta-Perdomo et Al, 2022; Leijon et Al, 2022). CBL is a constructivist and experiential learning approach that starts with real-life challenges offered to students from public and private organizations (challenge providers) seeking innovative and creative solutions.

CBL has been studied for its impact in terms of learning, teaching, and innovation (Sukacke et al, 2020). Firstly, from prior research, we know that CBL is a valid tool to stimulate entrepreneurship mindset and skills (Ktoridou & Eteokleous, 2012; Hölzner & Halberstadt, 2022). Thanks to instructive and experiential learning (Norrman et al., 2022), students are stimulated to improve their entrepreneurial skills and can experience a real job context. Secondly, CBL is a way to innovate the didactics and the teacher's role as a learning process facilitator in class (Eldebo et Al, 2022). CBL revolutionizes the way of teaching and the role of the teachers, who become coaches and mentors for students. Teachers are part of the learning process and become learners as well while they are teaching. Thirdly, CBL allows universities to impact communities by providing knowledge, expertise, and tools (García-Zambrano & Ruiz-Roqueñi, 2024). CBL delivers real solutions and outcomes regarding products, services, and processes that challenge providers can implement partially or totally.

CBL, as an active learning method, is an excellent methodology for fostering entrepreneurial competencies (Perez et al., 2020; Perez et al, 2023; Rincon et al, 2023). Alain Fayolle (2007) defines entrepreneurial skills as a combination of knowledge, behaviors, and attitudes that enable students to identify and exploit opportunities, manage resources, and navigate the complexities and uncertainties inherent in entrepreneurial activities. Despite the increasing use of CBL in HEIs to stimulate management students' entrepreneurship skills, research on its effects on students and entrepreneurial

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competences is still limited (Johnson et al. 2009; Martinez and Crusat, 2020; Palma-Mendoza et al. 2019; Vignoli et al. 2021; Colombelli et al, 2022). Only a few studies have investigated the CBL effectiveness in acquiring, cultivating, and retaining entrepreneurial skills (Fayolle et al, 2006; Dewettinck & van Ameijde, 2011; Portuguez Castro & Gomez Zermeno, 2021). In addition to this lack in literature, all studies limit their research on entrepreneurial skills development through pre- and post-tests, not considering their retention with a follow-up test (Colombelli et al, 2002; Silveyra-Leon et al, 2023; Bolzani & Luppi, 2021; Berginc et al., 2023). For that reason, the present paper aims to investigate how the CBL approach impacts not only the development but also the retention of entrepreneurial skills among university students. Thus, this study answers the following research questions: RQ1: What entrepreneurial skills do students acquire through a CBL and hands-on course? RQ2: Which skills persist in the long term, and which tend to diminish over time?

Entrepreneurial skills can be assessed by different scales and tools (Geisinger, 2016). The authors opted for the EntreComp framework (Bacigalupo et Al, 2020), which outlines 15 entrepreneurial skills divided into three macro areas: the ability to identify ideas and opportunities, the ability to mobilize helpful resources to solve problems and generate solutions, and the ability to manage a project. This tool has been chosen since it measures the achievement of entrepreneurial competencies (Ratiu et Al, 2023), unlike other questionnaires that assess the entrepreneurial intention (Vankov et Al, 2022; Armuna et Al, 2020) such as the Entrepreneurial Intention Questionnaire (EIQ) (Linan and Chen, 2009), or the entrepreneurship tendency such as the General Enterprising Tendency (GET) test (Caird, 1991). Specifically, the GET test focuses primarily on personality traits associated with entrepreneurial behavior, such as need for achievement, autonomy, and internal locus of control, and it is more oriented toward profiling rather than competence development. The EIQ, based on the Theory of Planned Behavior (Ajzen, 1991), measures entrepreneurial intention through constructs like personal attitude, subjective norm, and perceived behavioral control. It has theoretical robustness and is predictive of entrepreneurial behavior. However, it does not measure competencies or skills directly.

In contrast, the EntreComp questionnaire provides a more granular and developmental approach, emphasizing the learning process and the development of competences over time, making it more appropriate in educational contexts, particularly when entrepreneurship is not limited to business creation but also includes value creation in a broader sense. Furthermore, the EntreComp framework aligns well with the pedagogical principles of CBL, which emphasize active, experiential, and problem-oriented learning. In CBL settings, students engage in real-world challenges, collaboratively with stakeholders, teachers, and mentors, which stimulates the acquisition of competences such as creativity, mobilizing resources, working with others, and taking initiative-core components of the EntreComp framework. Thus, the use of the EntreComp questionnaire allows for the measurement of competencies that are not only relevant but also directly fostered by the CBL methodology applied in this study. This alignment ensures that the assessment tool reflects the learning objectives and pedagogical strategies employed in the intervention.

Thus, this study aims to fill some gaps in the literature. Most applications of CBL focus on student engagement or satisfaction, but not on measurable competence acquisition using established frameworks. The second one is the lack of standardized assessment tools in CBL contexts. There is no standardized, validated tool commonly used to assess entrepreneurial competence in CBL contexts, leading to fragmentation in how outcomes are measured. Many assessments rely on course-specific rubrics, self-perception surveys, or anecdotal reflections. The last one is the underexplored role of institutional and contextual factors: most research looks at CBL and entrepreneurial learning at the classroom level, while the influence of institutional support, educator competencies, and cross-sector collaboration remains underexplored.

Sustainability and Social Entrepreneurship course. *The 2023/2024 edition of the Course on Social Entrepreneurship and Sustainability is an integral component of the master's program in Management at the Department of Economics and Management, University of Trento. This 48-hour course, carrying 8 ECTS credits, focuses on hybrid and sustainable enterprises and is a CBL and hands-on course, requiring students to develop a project idea and social business model in response to real-world challenges posed by various entities (challenge providers) in the Trento region, such as organizations, cooperatives, and associations. Students are expected to propose innovative and sustainable solutions by engaging directly with these challenges.*

The course is divided into three main parts: problem validation, idea generation, and solution validation. In the problem validation phase, teams engage with challenge providers to understand the challenges, collect data through fieldwork, interviews, and desk research, and utilize tools such as fishbone diagrams, the iceberg model, and the five whys technique. They also envision future scenarios and trends and conduct market analysis using SWOT, PESTEL, stakeholders, and competitor analysis. During the idea generation phase, teams brainstorm to generate multiple solutions for the challenges, participate in structured brainstorming sessions to stimulate creativity and identify disruptive ideas, and present their ideas to challenge providers for feedback and selection of the final solution. In the solution validation phase, teams iteratively develop and validate the solution through fieldwork and interviews, create a social business model canvas and a business plan, and finally present their solutions in a pitch to an audience of teachers, investors, and entrepreneurs.

The class comprised 18 students, two of whom were non-attending. Students were divided into four heterogeneous teams, while the two non-attending students formed a separate team. Teams were constituted based on gender, a personality test, and students' preferences for specific thematic areas. This approach aims to create diverse groups that simulate real-world job situations where individuals do not select their colleagues.

Teachers selected five challenges from social organizations in the Trento region to address local social issues across various domains, including urban requalification, social inclusion, rural depopulation, sustainable tourism, and local food valorization. The selection process, which spanned two months, involved meeting and interviewing representatives from at least ten diverse organizations. The five chosen organizations were selected based on the relevance and urgency of their societal issues, their motivation to engage with students, and their capacity in terms of time, resources, and staff support. The challenge providers represented a range of organization types, including cooperatives, working integration social enterprises (WISEs), start-ups, foundations, and social organizations. The following five challenges were designed before the course's commencement (see Table 1).

Tab. 1: The five selected challenges and the challenge providers

Challenges	***Themes***	***Challenge providers***
1. Social tourism	*Social tourism project to generate funds and raise awareness of social issues among travelers, creating a replicable model in other cooperative settings.*	*Local social foundation and local cooperative*
2. Remote work in the valleys	*Fighting the depopulation of mountain areas, the closure of commercial activities, and the consequent abandonment of mountain areas. Teams had to work on fostering smart working places located in misused buildings.*	*Rural bank and cooperative*
3. Urban requalification and sustainability	*Support an urban requalification project to transform some spaces of the Trento train station into a public civic hub dedicated to addressing climate change and biodiversity loss.*	*Network of associations, local government, and public transportation*
4. Social Employment	*Relaunching the subcontracting business unit by identifying innovations in the contracting production process to maintain a significant turnover.*	*Local W.I.S.E.*
5. Ethical food delivery and local communities	*Support local restaurateurs in a phase of profound change, oriented towards sustainability and new technologies, starting with sustainable and ethical food delivery and developing the local communities.*	*A start-up based in Trento*

Purpose of the paper. *This working progress paper explores how the CBL approach stimulates the entrepreneurial skills' acquisition and retention among university management students.*

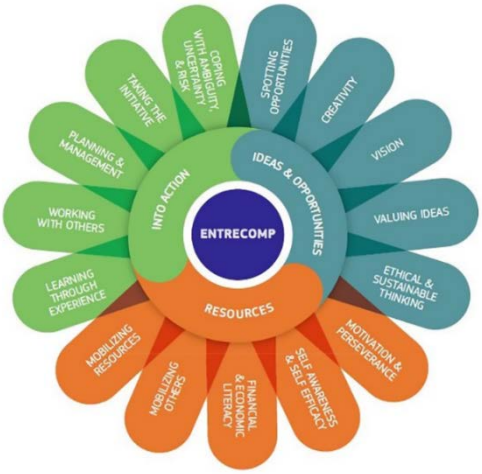
Methodology. *To measure not only the acquisition of entrepreneurial skills but also their retention, this study follows a qualitative case study approach (Yin, 2017), which is particularly suitable for addressing the complexities in innovation management research and providing an in-depth understanding of emerging phenomena based on qualitative data (Siggelkow, 2007). Data were collected from students using an EntreComp-based questionnaire administered at three distinct points in time: pre-test (beginning of the intervention - February 2024), post-test (end of the intervention - June 2024), and follow-up (12 months later from the beginning of the intervention - February 2025). The strengths of this tool are that it is a widely accepted framework in Europe; it is holistic and competence-based rather than trait- or knowledge-based, and it is suitable for integration into various disciplines and in the CBL. The main limitation may require contextualization for specific learning environments.*

The EntreComp questionnaire assesses 15 entrepreneurial competencies grouped into three key domains (Bacigalupo et al., 2020): (i) Ideas and Opportunities (Spotting opportunities, Creativity, Vision, Valuing ideas, Ethical and sustainable thinking), (ii) Resources (Self-awareness and self-efficacy, Motivation and perseverance, Mobilising resources, Financial and economic literacy, Mobilising others), and (iii) Into Action (Taking the initiative, Planning and management, Coping with ambiguity, uncertainty and risk, Working with others, Learning through experience). The questionnaire consists of 45 closed-ended questions, each structured as a Likert-type item (rated from 1 - lowest - to 10 - highest), grouped into 15 Likert scales corresponding to specific entrepreneurial competencies. Each competence was measured through three Likert-type items. For statistical analyses, individual competency scores were calculated by averaging responses across these three items for each participant, thus treating the data as continuous and suitable for comparative statistical procedures. To assess changes over the three measurement points (pre-test, post-test, and follow-up), non-parametric analyses were applied-specifically, pairwise Wilcoxon signed-rank tests-as recommended when analyzing Likert-scale data, which typically violate the assumptions required for parametric testing (Norman, 2010). This approach guarantees methodological rigor and enhances robustness in evaluating longitudinal changes in entrepreneurial competencies.

General Risks in the EntreComp Questionnaire are four. The first one is the self-report bias: the EntreComp-based survey relies on self-assessment, which may be affected by overconfidence or social desirability bias (Paulhus, 1984; Podsakoff et al, 2003). The second one is the Common Method Variance (CMV): using a single survey instrument for all measures can inflate correlations between constructs (Podsakoff et al, 2003). The third one is the multidimensionality complexity: the presence of 15 competences can create multicollinearity, especially if factor structures are not confirmed. And finally, the fatigue bias: with 45 items, respondents may suffer from fatigue or reduced attention, especially in post-test or follow-up settings (Diamantopoulos & Siguaw, 2006; Lavrakas, 2008). Each dimension and competence has detailed risks, common mitigation, and strategies considered for this study (Tables 2, 3, and 4). In general the first mitigation strategy is the Pre-Test/Post-Test/Follow-Up design: the use of a within-subjects, repeated-measures design allows for the assessment of relative change in competences, which is less prone to individual overstatement bias. This design helps control for individual differences and self-perception errors. The second one is the nonparametric statistical analysis (Wilcoxon Test): given the ordinal nature of Likert data and potential violations of normality due to small sample sizes or skewed distributions, the Wilcoxon signed-rank test was chosen. This nonparametric approach reduces the risk of Type I and II errors caused by inappropriate parametric assumptions. The third one is the item and dimension-level descriptive analysis. To identify problematic items or dimensions with extreme variance or low reliability, descriptive

statistics and internal consistency checks were conducted. Where needed, items showing low variance or poor interpretability were flagged for refinement in future iterations. The fourth one is the clear instructions and anonymity assurance. To reduce social desirability bias, participants were informed that their responses were anonymous and used only for research purposes, encouraging honest self-assessment. And, finally, the last one is the consistency in administration. All three survey waves were administered under similar conditions (timing, platform, guidance), limiting procedural biases that could arise from changes in context or facilitation.

Fig. 1: The EntreComp flower (Bacigalupo et Al, 2020)



Tab. 2: Risks, common mitigations and mitigation strategies for this study for Dimension 1: Ideas and Opportunities

Competence	***Definition***	***Potential Risks***	***Common Mitigations***	***Mitigation strategies***
1. Spotting opportunities	*Identifying opportunities to create value.*	*Overestimation of ability; confusion between opportunity and idea.*	*Use of concrete examples in items.*	*Repeated-measures design to track relative change.*
2. Creativity	*Developing creative and purposeful ideas.*	*Social desirability bias; inflated self-perception.*	*Encourage reflection or scenario-based items.*	*Anonymity + consistent survey conditions.*
3. Vision	*Imagining future scenarios to guide effort.*	*Vague responses; "halo" around idealized self-image.*	*Link to real experiences or past actions.*	*Prompting recall of recent learning experience.*
4. Valuing ideas	*Making the most of ideas and understanding their value.*	*Conceptual confusion (value vs. novelty); social pressure to rate oneself highly.*	*Clarify the distinction between idea value and originality.*	*Repetition in follow-up helped track durable change.*
5. Ethical and sustainable thinking	*Assessing impact and acting responsibly.*	*High social desirability risk; normative answers.*	*Include dilemmas or trade-offs; triangulate with observed behaviors.*	*Stress on anonymity and non-evaluation context.*

Tab. 3: Risks, common mitigations and mitigation strategies for this study for Dimension 2: Resources

Competence	***Definition***	***Potential Risks***	***Common Mitigations***	***Mitigation strategies***
6. Self-awareness and self-efficacy	*Knowing one's strengths and believing in one's ability.*	*Risk of overconfidence, particularly in post-tests.*	*Balance self-efficacy with behavioral anchoring.*	*Wilcoxon test to assess internal shifts.*
7. Motivation and perseverance	*Staying focused and recovering from setbacks.*	*Subjectivity and emotional bias, especially post-intervention.*	*Use of comparative ratings or time-specific scenarios.*	*Follow-up test adds temporal robustness.*
8. Mobilizing resources	*Gathering and using material, non-material resources.*	*Inflated self-perception (especially for intangible resources).*	*Specify resource types in survey items.*	*Wording aligned with the real course activity.*
9. Financial and economic literacy	*Understanding financial decisions and sustainability.*	*Competence is overestimated without practical exposure.*	*Combine with task-based testing when possible.*	*Self-assessment focused on perceived learning, not mastery.*
10. Mobilizing others	*Inspiring and involving others.*	*High risk of overclaiming leadership or influence.*	*Peer-assessment, or triangulation with team feedback.*	*Group setting recalled during item completion.*

Tab. 4: Risks, common mitigations and mitigation strategies for this study for Dimension 3: Into Action

Competence	***Definition***	***Potential Risks***	***Common Mitigations***	***Mitigation strategies***
11. Taking the initiative	*Taking responsibility to act.*	*Likely overstatement due to ideal self-image.*	*Contrast frequency vs. perceived importance.*	*Time-based repetition in the study adds reliability.*
12. Planning and management	*Prioritizing and setting achievable goals.*	*Misinterpretation of planning as overconfidence.*	*Clarify with concrete timeframes or contexts.*	*Questionnaire wording aligned with the course structure.*
13. Coping with uncertainty, ambiguity and risk	*Managing unpredictability.*	*High bias potential; may conflate stress tolerance with competence.*	*Scenario-based phrasing; behavioral anchoring.*	*Instructions encouraged honesty; post/follow-up tracked evolution.*
14. Working with others	*Collaborating effectively in teams.*	*Inflated ratings, especially in group-based courses.*	*Cross-validation with peer ratings.*	*Participants recalled specific team experiences.*
15. Learning through experience	*Learning from both success and failure.*	*Bias toward reporting learning from success; self-serving attribution.*	*Prompt reflection on past learning moments.*	*A follow-up test is particularly relevant here.*

Results. *Findings illustrate significant short-term improvements across all entrepreneurial competencies immediately after the intervention, confirming previous similar research (e.g., Bolzani & Luppi, 2021; Colombelli et al, 2022; Silveyra-León et al, 2023). Comparative analysis between the pre- and post-EntreComp questionnaire shows that, in general, students enhanced entrepreneurial competences. Table 5 shows the percentage of participants self-assessing 7 or more (meaning high level) for each competence at the beginning (Pre), at the end (Post), and after 12 months (Follow-up). There is a general progression between before and after the course. A notable progression can be seen in spotting high-value opportunities, coming up with innovative ideas, anticipating which new developments will be important in a specific field, and assessing various ways in which an idea can be developed successfully. Participants showed progression in contacting unknown people and making difficult decisions. Also, participants showed an advancement in financial and economic literacy, especially in the item concerning the project control costs. Moreover, participants advanced in competences like creating a plan, dealing with uncertainty when implementing new activities, and looking for new opportunities to develop new knowledge and skills.*

Tab. 5: Pre-, Post-, and follow-up EntreComp results

EntreComp	***Items for each competence***	***Pre (% ≥7) (18)***	***Post (% ≥7) (18)***	***Follow up (%≥7) (18)***
Spotting opportunities	*1. Identify opportunities for innovative value creation within your field of expertise*	*50.00*	*94.44*	*100.00*
	2. Anticipate which opportunities will be of high value	*33.33*	*77.78*	*94.44*
	3. Select the most valuable opportunity when faced with multiple options	*61.11*	*94.44*	*94.44*
Creativity	*4. Come up with innovative ideas*	*22.22*	*72.22*	*72.22*
	5. Come up with new and different solutions	*55.56*	*77.78*	*94.44*
	6. Find new ways of solving problems	*55.56*	*88.89*	*100.00*
Ethical and sustainable thinking	*7. Assess the social and ecological impact of your ideas*	*66.67*	*100.00*	*88.89*
	8. Apply sustainability values (social and ecological) to your practice	*66.67*	*100.00*	*88.89*
	9. Assess what is seen as "good sustainable practice" within your field of expertise	*66.67*	*88.89*	*88.89*
Valuing ideas	*10. Identify the novel value in new ideas within your field of expertise*	*44.44*	*77.78*	*83.33*
	11. Assess which needs and requirements are necessary to solve the most important challenges within your field	*55.56*	*83.33*	*83.33*
	12. Anticipate which new developments will be of importance within your field	*33.33*	*77.78*	*64.71*
Vision	*13. Assess various ways in which your ideas can develop successfully*	*38.89*	*83.33*	*77.78*
	14. Imagine novel connections and relationships that will be important for the development of your ideas	*50.00*	*94.44*	*100.00*
	15. Anticipate what you need to do to reach the goals you set	*61.11*	*88.89*	*94.44*
Self-awareness and self-efficacy	*16. Achieve goals that you set for yourself*	*94.44*	*100.00*	*100.00*
	17. Perform tasks that you are unfamiliar with	*55.56*	*88.89*	*77.78*
	18. Succeed in endeavours that you set your mind to	*72.22*	*94.44*	*88.89*
Motivation and perseverance	*19. Finish tasks that you have started, even if you are tired of them*	*77.78*	*100.00*	*83.33*
	20. Continue to work on tasks despite setbacks and failures	*72.22*	*94.44*	*94.44*
	21. Immediately start working on tasks, even if they are challenging	*66.67*	*83.33*	*82.35*
Mobilising resources	*22. Actively network to increase your number and quality of your contacts*	*50.00*	*100.00*	*61.11*
	23. Find the right people to assist you with various tasks	*66.67*	*83.33*	*88.24*
	24. Contact people you do not know when you need something	*44.44*	*94.44*	*66.67*
Financial and economic literacy	*25. Estimate a budget for a new project*	*50.00*	*77.78*	*72.22*
	26. Control costs in projects	*55.56*	*88.89*	*77.78*
	27. Read and interpret financial statements	*72.22*	*77.78*	*77.78*
Mobilising others	*28. Make people enthusiastic about your ideas*	*61.11*	*88.89*	*77.78*
	29. Convey your ideas in an enthusiastic manner	*66.67*	*88.89*	*72.22*
	30. Convince others to engage in your activities	*50.00*	*88.89*	*82.35*
Taking the initiative	*31. Be the one who takes the initiative*	*72.22*	*83.33*	*94.44*
	32. Make difficult decisions	*55.56*	*88.89*	*77.78*
	33. Quickly assess complex situations	*61.11*	*83.33*	*77.78*
Planning and management	*34. Create a project plan*	*50.00*	*88.89*	*66.67*
	35. Organise and structure tasks in a project	*61.11*	*83.33*	*77.78*
	36. Set project goals	*66.67*	*88.89*	*88.89*
Coping with ambiguity, uncertainty, and risk	*37. Deal with uncertainty when implementing new activities*	*55.56*	*94.44*	*77.78*
	38. Work under stress and pressure	*72.22*	*88.89*	*83.33*
	39. Deal with sudden changes and surprises	*66.67*	*94.44*	*77.78*
Working with others	*40. Work with many different people*	*77.78*	*100.00*	*88.89*
	41. Actively participate in teamwork	*88.89*	*100.00*	*100.00*
	42. Promote your ideas and opinions when working in a group	*72.22*	*88.89*	*94.44*
Learning through experience	*43. Look for new opportunities to develop new knowledge and skills*	*55.56*	*88.89*	*72.22*
	44. Learn from challenging tasks	*83.33*	*94.44*	*94.44*
	45. Select challenging work tasks that you can learn a lot from	*66.67*	*100.00*	*77.78*

However, while some skills remained stable at the one-year follow-up, others reverted to the baseline. Table 5 also shows that for certain competences, there is a regression, meaning that some competences are harder to maintain than others between immediately after the course and after 12 months. Specifically, the ethical and sustainable thinking seems a more "fluid" competence: assess the social and ecological impact of your ideas, apply sustainability values (social and ecological) to practice, and assess what is seen as "good sustainable practice" within the field of expertise. Participants regressed in the Valuing ideas and vision competence: assessing which needs and requirements are necessary to solve the most important challenges within the field, anticipating which new developments will be of importance within the field, and assessing various ways in which ideas can develop successfully. Moreover, some aspects of self-awareness,

self-efficacy, and motivation and perseverance decreased, such as performing unfamiliar tasks, succeeding in endeavours, and finishing tasks. Mobilising resources was affected by a regression, too, and in particular, actively networking to increase the number and quality of contacts and contacting unknown people. Taking initiative, Planning and Management, and Coping with ambiguity, uncertainty, and risk, as well as learning through experience, are competencies that have decreased.

Table 6 summarizes results from Wilcoxon signed-rank tests comparing students' entrepreneurial competencies at three measurement points: before the intervention (Pre), immediately after the course (Post), and at a one-year follow-up (Follow-up). Statistical significance was evaluated using a threshold of $p < 0.05$. All competencies improved significantly immediately following the intervention (Pre-Post comparison), with the strongest effects observed for Mobilising resources (+1.76 points; $p < 0.001$), Spotting opportunities (+1.54 points; $p < 0.001$), and Creativity (+1.41 points; $p < 0.000$). On the contrary, the weakest effects can be observed for Self-awareness and self-efficacy (+0.57 points; $p = 0.03$), Motivation and perseverance (+0.93 points; $p = 0.03$), and Working with others (+0.94 points; $p < 0.003$), and Taking the initiative (+0.96 points; $p < 0.001$). This pattern demonstrates the clear short-term effectiveness of the educational intervention across the EntreComp framework.

At the one-year follow-up (Pre-Follow-up comparison), improvements relative to the baseline persisted for many, but not all, competencies, though typically with smaller effect sizes. Specifically, sustained improvements were consistently found for all competencies within the Ideas and Opportunities area. An example of this can be observed in Creativity (+1.56 points; $p < 0.000$), Spotting opportunities (+1.52 points; $p < 0.000$), and Ethical and sustainable thinking (+1.29 points; $p < 0.000$). In contrast, competencies primarily related to Resources and Into Action areas (e.g., Self-awareness and self-efficacy, Motivation and perseverance, Mobilising resources, Coping with ambiguity, uncertainty, and risk, Working with others, Learning through experience) did not maintain statistically significant improvements relative to baseline after one year, suggesting a return to initial levels. The most visible effect can be noticed in Motivation and perseverance (+0.30 points; $p = 0.57$), Self-awareness and self-efficacy (+0.30 points; $p = 0.38$), and Learning through experience (+0.57 points; $p = 0.06$).

However, complementary insights are provided by the Post-Follow-up comparison, which directly assesses whether competencies declined significantly between the immediate post-course measurement and the one-year follow-up. According to this analysis, declines observed in competencies such as Self-awareness and self-efficacy, Motivation and perseverance, Working with others, and Learning through experience were not statistically significant. This result indicates that the apparent losses in these competencies, according to the previous analysis, might be a relatively minor case. Nevertheless, caution is warranted when interpreting this finding due to the study's relatively small sample size and associated methodological limitations.

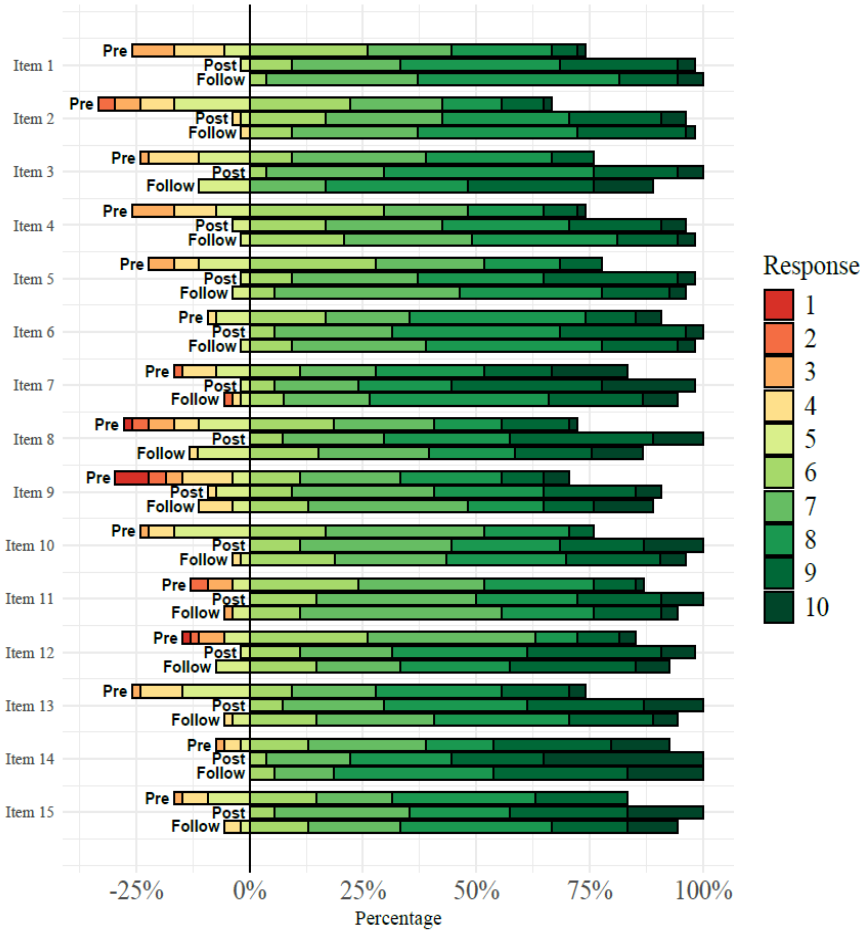
Taken together, these findings highlight two crucial insights: competencies related to creativity, idea generation, vision, and ethical thinking (Ideas and Opportunities area) seem inherently more stable, maintaining improvements over the long term, while competencies related to personal resilience, mobilization of resources, and coping strategies (Resources and Into Action) appear less stable, indicating that sustained reinforcement or ongoing support might be needed to ensure their retention.

Figure 2 complements these results by graphically illustrating the evolution of students' entrepreneurial competencies across the three measurement points through a clustered diverging stacked bar chart. This visualization reveals both the magnitude and consistency of changes across competency levels. In particular, it highlights the near disappearance of negative ratings after the intervention (Post), a positive shift which is largely sustained at the Follow-up assessment.

Tab. 6: Averages comparison between pre- and post- and between pre- and follow-up

Areas - EntreComp	Items - EntreComp	Delta (Pre-Post)	V (Pre-Post)	P-Value (Pre-Post)	Delta (Pre-Follow-up)	V (Pre-Follow-up)	P-Value (Pre-Follow-up)	Delta (Post-Follow-up)	V (Post-Follow-up)	P-Value (Post-Follow-up)
Ideas and Opportunities	*Spotting opportunities*	1.54	2.00	0.00	1.52	1.00	0.00	-0.02	63.00	0.82
	Creativity	1.41	1.00	0.00	1.56	7.50	0.00	0.15	63.00	0.54
	Ethical and sustainable thinking	1.22	16.50	0.01	1.29	4.50	0.00	0.07	50.50	0.61
	Valuing ideas	1.33	0.00	0.00	1.19	9.50	0.00	-0.15	51.00	0.73
	Vision	1.39	10.00	0.00	1.13	4.50	0.00	-0.26	91.00	0.24
Resources	*Self-awareness and self-efficacy*	0.57	30.50	0.03	0.30	50.50	0.38	-0.28	97.00	0.14
	Motivation and perseverance	0.93	26.50	0.03	0.30	43.00	0.57	-0.62	117.00	0.06
	Mobilising resources	1.76	7.00	0.00	1.03	32.50	0.12	-0.73	123.50	0.03
	Financial and economic literacy	1.24	8.00	0.00	1.08	16.00	0.01	-0.17	73.00	0.47
	Mobilising others	1.33	4.00	0.00	1.01	21.00	0.01	-0.32	87.50	0.12
Into Action	*Taking the initiative*	0.96	7.50	0.00	0.59	26.00	0.03	-0.37	109.50	0.12
	Planning and management	1.37	10.50	0.00	1.13	20.50	0.01	-0.24	74.50	0.17
	Coping with ambiguity, uncertainty, and risk	1.20	6.00	0.00	0.61	33.50	0.14	-0.59	98.00	0.03
	Working with others	0.94	12.00	0.00	0.68	35.00	0.09	-0.26	58.00	0.40
	Learning through experience	1.04	17.50	0.01	0.57	22.50	0.06	-0.46	80.00	0.09

Fig. 2: Clustered diverging stacked bar chart



Research limitations. *This study is a work-in-progress and a pilot one, and it is in a preliminary analytical stage. It presents several limitations. The number of students considered as a sample is small and makes it difficult to obtain generalised results. The EntreComp test is a self-reported questionnaire and might be critical in terms of impartiality: it can be affected by cultural and personal biases (Schmidt & Hunter, 1998), as well as self-overestimation or self-underestimation of one's entrepreneurial skills. To mitigate these limitations, the current data will be enriched by extracts from students' reflection reports (Gibbs, 1988), served as a structured document guiding students through six stages to reflect on their experiences, allowing them to organize their thoughts, identify what went well and what did not, and plan their future actions. The reflection reports were completed and delivered by students at the end of the course, in conjunction with the EntreComp post-test (end of the intervention - June 2024). The integration of qualitative data, such as the Reflection Reports, can explain some of the results gathered from the EntreComp post-test.*

To enlarge the sample, the authors have started a new cycle of data collection, administering the EntreComp questionnaire to 2024/2025 students' courses. The EntreComp questionnaire will be administered at three distinct points in time: pre-test (beginning of the intervention - February 2025), post-test (end of the intervention - June 2025), and follow-up (12 months later from the beginning of the intervention - February 2026). The new data will be integrated into the study and analysed.

In addition, the authors consider making a comparative study between students of different business schools.

Managerial implications. *This study provides detailed insights into how challenge-based learning (CBL) courses can be effectively designed and managed to optimize entrepreneurship education initiatives. Based on the experiences documented in this research, we identify five key managerial implications that educators and administrators may consider to improve similar CBL-based educational programs to help students develop and retain entrepreneurial competencies (Table 7). First, careful selection of challenge providers is essential. Organizations participating as challenge providers might need more time to be ready for this new way of interacting with students. The CBL is a new way of teaching and learning that is far from the traditional one, and companies need to be used to working interactively with students. Providers with clear internal governance structures typically offer stronger guidance to students, enhancing student motivation. Additionally, allocating sufficient time for meaningful interactions between students and providers is critical for maximizing student engagement and outcomes. Educators should prioritize partnerships with organizations that demonstrate openness to collaboration, have clear internal structures, and are willing to dedicate time and resources to the learning process. To stimulate students' entrepreneurial thinking, providers should be encouraged to involve students*

in real, unresolved strategic issues that require initiative, creativity, and value creation. Long-term engagement with providers through feedback loops and post-course mentoring opportunities can help maintain motivation and reinforce entrepreneurial identity.

Second, effective challenge design is fundamental and should occur well in advance of course commencement. Articulated objectives, expected outcomes, and defined project boundaries must be established collaboratively with challenge providers to provide students with a structured framework. To enhance entrepreneurial skills such as opportunity recognition and strategic planning, educators can embed milestone checkpoints that require students to refine their ideas using business model tools, customer validation, and structured feedback sessions. This process promotes critical thinking and disciplined initiative-core components of the EntreComp framework.

Third, theoretical foundations and relevant methodological tools should be introduced comprehensively during the initial phases of the course. Early exposure to these concepts equips students with essential knowledge and techniques needed for effectively tackling the challenge. To foster knowledge retention and application, these tools (e.g., lean startup, design thinking, stakeholder mapping) should be directly tied to the students' challenge work through applied workshops, peer teaching, and reflective assignments. Encouraging students to maintain a learning journal or entrepreneurial logbook can help internalize key frameworks and connect them to their own experiences and growth.

Fourth, the course structure should be adapted to allocate increased time for the validation and development of practical solutions. Adequate time for hands-on experimentation and iterative refinement processes is necessary to enhance the effectiveness and applicability of student solutions. To stimulate entrepreneurial perseverance and problem-solving, educators can incorporate "pivot moments" into the course timeline-deliberate review points where students reassess assumptions and potentially reorient their strategies based on real-world feedback.

Finally, the fifth implication is connected to dedicating more time to soft skills exercises, primarily focusing on creativity, getting out of the comfort zone, and stress management. This can be achieved through creativity warm-up sessions, improvisation games, resilience-building exercises, and structured team debriefings. For long-term impact, students can be encouraged to co-develop personal development plans (PDPs) that link entrepreneurial self-efficacy goals with ongoing behaviors, even after the course ends.

Tab. 7: Managerial implications and recommendations for stimulating and sustaining entrepreneurial skills

Managerial implications	***Recommendations***	***Suggestions to Stimulate & Sustain Entrepreneurial Skills***
1. Careful Selection of Challenge Providers	*Choose providers with clear governance and readiness for interactive collaboration.*	*Select real, unresolved strategic challenges.*
		Encourage post-course mentoring from providers.
		Foster long-term engagement with students.
2. Effective Challenge Design	*Co-design challenges with clear objectives, outcomes, and boundaries.*	*Use milestone-based progress tracking.*
		Integrate business model tools and customer validation steps.
		Conduct structured feedback and reflection sessions.
3. Early Introduction of Theory & Tools	*Teach relevant frameworks and methods at the beginning of the course.*	*Link tools directly to challenge activities.*
		Use applied workshops and peer-teaching.
		Assign learning journals or entrepreneurial logbooks.
4. Time for Validation & Development	*Allow more time for iterative solution testing and validation.*	*Include prototyping, field testing, and stakeholder interviews.*
		Introduce "pivot moments" for strategic reassessment.
		Encourage trial-and-error learning and adaptive thinking.
5. Soft Skills Development	*Emphasize creativity, stepping out of the comfort zone, and stress management.*	*Use creativity exercises and improvisation games.*
		Include stress resilience and reflection practices.
		Guide students in developing personal development plans (PDPs).

Originality of the paper. *This case study offers a unique perspective by measuring not only the development of entrepreneurial skills but also in retention level of entrepreneurial skills in a management challenge-based course. While previous studies have focused on the skills acquisition using pre- and post-tests, this paper considers and compares pre-/post and follow-up students' entrepreneurial competences evaluations. Its originality lies in the cross-analysis of data from the same course. The paper contributes to applying CBL into entrepreneurship education literature, analyzing the immediate acquisition and long-term retention of entrepreneurial skills. The research contributes to a deeper understanding of how CBL can optimize skill development and retention among students. Ultimately, this study seeks to highlight how educators can adapt CBL methods to better support the development of entrepreneurial competencies.*

Key words: *Challenge-Based Learning; Social Entrepreneurship; Entrepreneurial competences; Entrepreneurial University*

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La Teoria della Attribuzione come quadro per la comprensione delle determinanti che guidano l'individuo verso la scelta di lavorare nella sostenibilità

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Abstract

La crescente pressione normativo-istituzionale nei confronti dei temi della sostenibilità ha influenzato le organizzazioni nei propri processi di assunzione e, conseguentemente, ha orientato le scelte formative e professionalizzanti di molti.

La comprensione delle cause di successo o di fallimento verso un obiettivo professionale individuale orientato alla sostenibilità sono, quindi, aspetti importanti per coloro che devono individuare/selezionare i soggetti più idonei a intraprendere un percorso formativo o professionalizzante.

In questo contesto la ricerca analizza il successo delle carriere professionali di 63 soggetti che hanno frequentato il primo corso formativo italiano dedicato alla sostenibilità.

I risultati mostrano i tratti comuni tra coloro che hanno trovato spazio nel mercato del lavoro dedicato alla sostenibilità.

Framing of the research. *La crescente pressione normativo-istituzionale nei confronti dei temi della sostenibilità ha influenzato le organizzazioni nei propri processi di assunzione e, conseguentemente, ha orientato le scelte formative e professionalizzanti di molti.*

Da un lato le imprese si muovono alla ricerca di professionisti competenti sui temi della sostenibilità o indirizzano risorse già presenti verso questi temi. Dall'altro le grandi società di consulenza hanno dichiarato un trend di assunzione senza precedenti dedicato ai professionisti della sostenibilità.

Dal punto di vista formativo, le università pubbliche e private così come centri di formazione di altro tipo hanno orientato nuovi corsi di studio o moduli specifici dedicati alla sostenibilità.

In questo contesto risulta importante capire quali siano i driver che fungono da determinanti per il successo delle carriere individuali e, per osmosi, per il successo dell'organizzazione stessa.

La ricerca presentata ha proprio lo scopo di rispondere a questa domanda: quali sono i driver che determinano la capacità dell'individuo di entrare nel settore della sostenibilità.

Il disegno di ricerca si basa sulla Teoria dell'Attribuzione, qui applicata come framework per leggere quali determinanti possano aver costituito i driver di un percorso di carriera verso la sostenibilità. In particolare, attraverso la lettura delle lettere motivazioni di accesso ad un corso formativo dedicato alla sostenibilità, la ricerca cerca di individuare pattern comuni che possano portare alla definizione di determinanti aver influenzato il percorso di carriera verso la sostenibilità.

In questo senso, il percorso di carriera di 63 studenti che hanno preso parte a un corso formativo in gestione della sostenibilità è stato osservato dal loro primo approccio alla sostenibilità, ovvero l'iscrizione al corso formativo, fino all'attuale ruolo ricoperto.

La novità è che tali determinanti sono osservati dal ricercatore a posteriori piuttosto che dagli studenti stessi sulla base dell'osservazione del proprio percorso.

La ricerca mette in luce implicazioni manageriali sia per le imprese sia per le organizzazioni formative.

Purpose of the paper. *La teoria dell'attribuzione fornisce il quadro necessario per comprendere come gli individui spiegano perché si sono verificate alcune dinamiche all'interno del proprio ambiente (Heider 1958)*

Negli studi di management, la teoria dell'attribuzione è utilizzata per spiegare come gli attori delle organizzazioni, manager e/o dipendenti, interpretano le cause dei successi o dei fallimenti all'interno del proprio contesto lavorativo (Martinko et al., 2011). Negli ultimi anni, i database dei contributi scientifici pubblicati hanno messo in evidenza un crescente interesse sulla teoria.

L'identificazione delle attribuzioni consente di comprendere le motivazioni, di gestire i conflitti interni, plasma la cultura aziendale e incide sulle performance dei team e dell'organizzazione tutta. I manager che comprendono come le

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attribuzioni influenzano le dinamiche lavorative possono migliorare le loro pratiche di gestione, ottimizzare le performance e creare un ambiente di lavoro più positivo e produttivo.

Attraverso la comprensione dei processi di attribuzione, gli stessi sono emersi anche come un importante aspetto per moderare il comportamento di supervisione e le eventuali illegittime segnalazioni da parte dei subordinati (Mackey, 2017).

La teoria dell'attribuzione relativamente alla crescita delle carriere individuali è stata utilizzata nel settore medicale (Merril et al., 1996) e nelle carriere federali (Daley, 1996). Altri studi hanno utilizzato la teoria per descrivere le barriere allo sviluppo delle carriere (Albert e Luzzo, 1999) e nell'identificazione delle discriminazioni nei luoghi di lavoro (Randle et al., 2012). Infine, gli studi di management hanno utilizzato la teoria dell'attribuzione per osservare lo sviluppo della sindrome dell'impostore nelle donne (Vaughn et al., 2020).

Secondo quanto osservato, la teoria delle attribuzioni non è ancora stata utilizzata come strumento per osservare le dinamiche di carriera nel settore della sostenibilità. In questo senso il contributo teorico è in primo luogo una estensione dell'utilizzo della teoria e una sua concreta applicazione anche ai fini manageriali per l'identificazione dei soggetti chiave da formare e coltivare per lo sviluppo della carriera.

Methodology. *La ricerca condotta si basa sull'analisi dei percorsi individuali di carriera di studenti che hanno deciso di intraprendere un corso di studio incentrato sul sustainability management. In particolare, gli studenti oggetto di analisi sono stati quelli che nel triennio 2021-2023 hanno preso parte ad un corso formativo avviato nel 2007, primo in Italia, focalizzato sul tema del ciclo integrato dei rifiuti. Il corso formativo ha quindi vissuto una evoluzione in linea con i nuovi aggiornamenti normativi e le nuove sensibilità sui temi ambientali. Dal 2017 il corso formativo analizzato infatti ha integrato il tema dell'economia circolare, nella prospettiva dell'Agenda 2030 per lo Sviluppo Sostenibile delle Nazioni Unite e continua il suo aggiornamento sui temi della rendicontazione di sostenibilità ed il Green Deal.*

La ricerca condotta si è basata sull'analisi delle motivazioni fornite dagli stessi studenti in fase di adesione al corso formativo. Considerato che le motivazioni che conducono a scelte professionali sono di natura soggettiva, la scelta di analizzare i dati attraverso un approccio qualitativo ha assicurato la piena comprensione del contenuto e dei percorsi intrapresi.

Osservando i percorsi di carriera a seguito del corso formativo, le ricercatrici hanno quindi cercato di capire quali motivazioni personali (fattori interni) e quali motivazioni di contesto (fattori esterni) addotte per evidenziare la propria motivazione e l'interesse ad entrare al corso formativo costituiscano le basi per la costruzione di un professionista e/o un manager effettivamente operante nel settore della sostenibilità.

In particolare, sono stati osservati 63 studenti di cui il 45% donne ed il 55% uomini. Gli studenti, ormai inseriti nel mondo del lavoro, sono stati classificati come "operanti" o "non operanti" all'interno del settore della sostenibilità e in "figura operante in ruolo manageriale o con percorso manageriale in corso" o "figura operativa".

Le ricercatrici hanno quindi individuato 4 cluster di studenti quali: (1) manager della sostenibilità, (2) manager altro, (3) operativi della sostenibilità e (4) non operativi della sostenibilità.

I 4 cluster individuati sono quindi stati analizzati indipendentemente l'uno dall'altro per capire quali pattern comuni di motivazione accomunano i soggetti ricadenti al loro interno.

L'analisi condotta ha quindi seguito un approccio induttivo (Edmondson and McManus, 2007) dei dati grezzi così come erano stati raccolti negli anni dagli uffici amministrativi per conto del comitato scientifico del corso formativo. L'analisi di codifica svolta è stata quindi condotta manualmente da una delle ricercatrici che ha poi condiviso le interpretazioni certe, per ottenere conferma, e quelle incerte, per condividere dubbi, con l'altra ricercatrice. Il doppio step analitico ha avuto lo scopo di ridurre gli elementi di soggettività tipici delle ricerche di tipo qualitativo.

Results. *Complessivamente i 4 cluster individuati hanno mostrato come dei 63 studenti analizzati, 16 hanno ottenuto un ruolo manageriale o hanno intrapreso un percorso di crescita professionale in quel senso, mentre 47 coprono una posizione operativa.*

Rispetto al posizionamento nel settore della sostenibilità, 40 ex studenti hanno effettivamente intrapreso una carriera nel settore mentre 23 sono operativi in altri settori.

Attribuzioni interne

L'analisi delle lettere ha messo in evidenza come tra le motivazioni interne, principalmente sia diffuso il desiderio di intraprendere una conoscenza dei temi della sostenibilità per avviare una crescita professionale. Gli studenti, infatti, hanno evidenziato come la consapevolezza di un settore in crescita li abbia guidati verso la partecipazione al corso di formazione oggetto di analisi.

Tuttavia, la differenza tra coloro che hanno ottenuto una posizione manageriale e coloro che hanno ottenuto una posizione operativa all'interno del settore sta nel livello di ambizione.

Le lettere mettono infatti in evidenza come i primi abbiano principalmente parlato di un interesse verso una crescita professionale generica, mentre i secondi (gli operativi) abbiano parlato di ambizioni manageriali. In questo senso emerge come una ambizione professionale più alta rappresenti quasi un ostacolo rispetto ad un desiderio di crescita professionale generica.

Altro aspetto chiave è quello che gli operativi hanno spesso racchiuso nel concetto di "contributo alla transizione sociale alla sostenibilità". In questo senso, il contributo alla sfera sociale è emerso come importante per ottenere una posizione lavorativa nel settore, ma non in un ruolo apicale.

Infine, l'interesse personale al tema, spesso declinato sui temi dell'energia, caratterizza sia coloro che hanno successivamente ottenuto una posizione come operatori "semplici" che come manager.

Attribuzioni esterne

L'individuazione di attribuzioni esterne, e quindi derivanti dall'ambiente in cui gli studenti osservati si muovono, è emerso come aspetto meno diffuso.

In questo senso gli studenti osservati sono mossi principalmente da motivazioni interne.

L'ambiente sociale emerge come driver dell'avvicinamento alla sostenibilità principalmente grazie ai temi dello spreco delle risorse da parte degli ambienti urbani e delle imprese.

In questo senso emerge che chi ha una maggiore sensibilità rispetto ai temi dello spreco sembra avere maggiore capacità di ricoprire ruoli manageriali. Dati i risultati è ipotizzabile che le imprese, ambienti nelle quali viene poi sviluppato il percorso di carriera, siano più attente a questi temi e che selezionino i soggetti che mostrano maggiore competenza ed interesse sul tema.

Secondo aspetto emerso è quello di avvicinamento ai temi della sostenibilità poichè i principali player economici mostrano interesse sul tema. Tale aspetto caratterizza principalmente coloro che hanno ottenuto una posizione come operativi nel settore.

Research limitations. *Criticità dello studio sono legate alla dinamicità che caratterizza la crescita professionale degli individui. In questo senso è possibile che i soggetti osservati che più recentemente hanno concluso il loro percorso di studi ottengano nei prossimi anni una posizione all'interno del settore o una posizione in un ruolo manageriale.*

Altra criticità è legata al fatto che l'osservazione delle posizioni ricoperte dai soggetti analizzati è stata fatta attraverso l'analisi dei loro profili professionali social. In questo senso non si ha la certezza del livello di aggiornamento delle informazioni reperite.

Lo studio presentato è ancora in fase di elaborazione ed è possibile che gli sviluppi successivi possano, in parte, contrastare i risultati ottenuti fino ad ora. Sviluppi futuri dello studio metteranno in luce eventuali temi che emergono come barriere all'ingresso nel settore.

Managerial implications. *In termini di implicazioni manageriali, i risultati del paper possono essere di supporto principalmente per due tipi di soggetti: gli attori del settore formativo e gli operatori dell'HR.*

In questo senso, i formatori potranno selezionare quei soggetti che hanno maggiore possibilità di avviare una carriera professionale nel mondo della sostenibilità. Tale aspetto risulta fondamentale per il posizionamento di un corso di formazione che necessità una affermazione sul mercato dei corsi professionalizzanti. Le statistiche sul successo della carriera degli individui a valle di un percorso formativo sono infatti spesso aspetti che orientano sia i futuri studenti che le imprese che intendono supportare economicamente un percorso formativo dal quale poi attingere per la selezione di future risorse umane.

La ricerca mette in luce significative implicazioni manageriali capaci di incidere sul successo o il fallimento dell'organizzazione nei confronti della propria transizione verso la sostenibilità. La scelta di soggetti interni idonei a ricoprire il ruolo di responsabile della sostenibilità può infatti portare l'impresa a rispondere in modo più idoneo alle pressioni socio-istituzionali rispetto all'integrazione dei temi di sostenibilità nelle proprie operazioni.

Originality of the paper. *Secondo quanto osservato, la teoria delle attribuzioni non è ancora stata utilizzata come strumento per osservare le dinamiche di carriera nel settore della sostenibilità.*

Key words: *organizzazioni no-profit; stili di leadership; tratti della personalità; performance; ricerca-azione*

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Decentralized Finance as an alternative financing channel for SMEs: Challenges and Opportunities

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Access to capital markets is a major challenge for small and medium-sized enterprises (SMEs), especially in countries with a strong manufacturing and industrial base such as Italy. Traditional financing methods often impose barriers due to credit availability and managerial constraints. Decentralized Finance (DeFi), based on blockchain technology, offers an innovative solution through smart contracts, tokenization, and decentralized exchanges (DEX).

This exploratory study analyzes how SMEs can leverage DeFi tools-such as stablecoins, lending platforms, and asset tokenization-to optimize liquidity and increase market competitiveness. The study highlights both advantages and potential risks, including regulatory challenges and technological constraints. A key driver of this transformation is the expertise of investors who fund SMEs through DeFi tools, while SMEs themselves must develop strong financial and technological skills to access these new financing methods in a responsible and sustainable way.

The findings suggest that DeFi presents an opportunity to revolutionize financial accessibility for SMEs, though institutional and managerial adaptations are required for effective adoption.

JEL CODE: G23, L26, M13

Keywords: *Decentralized Finance, SMEs, Blockchain, FinTech, Tokenization, Alternative Financing*

Introduction. *Small and medium-sized enterprises (SMEs) have long played a vital role in global economic development and job creation. In Italy, their importance is even more pronounced, with nearly 4 million registered SMEs as of 2023. Over the past 25 years, the number of micro (0-9 employees), small (10-49 employees), and medium-sized (50-249 employees) firms has grown by more than 30%, contributing significantly to employment, innovation, and industrial specialization (European Commission, 2023). Specifically, in the EU, SMEs constitute 99.8% of all enterprises in the non-financial sector, accounting for 65.2% of the workforce and generating more than half of the total value added. Similarly, in the rest of the world, for example in Indonesia, SMEs contribute 60.5% to the country's GDP. It should also be noted that SMEs are predominant in some sectors, such as construction, tourism and textiles, which are the top three areas where SMEs generate a higher percentage of value added than large enterprises. (OECD, 2022).*

As of 2024, the global economic outlook remained stable, with growth forecast at 3.2 % and inflation expected to fall to 4.3 % by 2025. The EU's economic outlook remains uncertain, with geopolitical tensions and vulnerabilities in energy security posing significant risks. With regard to Italy's economic development, as we will go into in more detail below, GDP in 2024 will increase by 0.5% compared to 2023, thanks to an increase in consumption and foreign demand, while investment will drop by 3.7%. On top of that, GDP is expected to grow by 0.8% in 2025, with a further contraction of investment by 1.2% (EY, 2024)

Despite their crucial role in the economy, small and medium-sized enterprises (SMEs) face a range of significant challenges, including globalization, rising interest rates, and geopolitical tensions. A notable example is the Trump administration's decision to impose tariffs, an action estimated to reduce U.S. GDP by 0.4%, with cascading effects on the global economy.

For Italy, where exports account for nearly one-third of national GDP, such developments are especially critical. A study by Macchi (2025) reports that Italy achieved a €34 billion trade surplus in 2023 yet also stresses how import-driven trade policies can benefit fast-growing economies by ensuring access to essential raw materials. These dynamics underline vulnerability and complexity. The same study points out that, by contrast, running a trade deficit can be advantageous for rapidly growing economies, as they often require large quantities of imported raw materials to fuel their production capacity. These dynamics highlight the vulnerability and complexity of the environment in which SMEs operate, especially in export-oriented economies like Italy (Macchi, 2025).

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Access to finance remains a critical issue for SMEs globally, with various sources of funding, including bank loans, venture capital, private equity and alternative financing methods such as crowdfunding, becoming increasingly important. In fact, the value of private equity transactions in Italy reached USD 10.24 billion in 2024, an annual growth rate of 11.19% compared to USD 9.20 billion in 2024. while the European private equity market hit USD 193.28 billion, with a projected 3.3% increase in 2025 (Statista, 2024).

The European Investment Fund (EIF) also explains how one in four SMEs continues to report significant financing difficulties, in some areas, there are signs of recovery, particularly due to improved economic conditions and increased availability of public and private lenders. Bank loans are used by 14% of SMEs, while almost half consider them important but difficult to obtain. Equity finance faces even more significant challenges: although 12% of SMEs consider it a relevant source of capital, only 1% manage to access it, highlighting the high barriers limiting its uptake. At the same time, other forms of alternative financing are gaining relevance on the Italian scene, including invoice trading, peer-to-peer (P2P) lending, and equity crowdfunding. The strengthening of these instruments is part of a broader European context, in which alternative financing for SMEs (excluding the UK) has increased from EUR 595 million in 2015 to over EUR 5.1 billion in 2020.

The aim of the following paper is precisely to provide a general overview of the potential use of DeFi for small and medium-sized enterprises. To this end, it is necessary to explain - firstly - how the blockchain is structured and what the process is, which is the basis on which the structure of the DeFi ecosystem is built.

The European Digital Agenda defines it as a distributed ledger technology (DLT) that enables the secure and permanent recording of exchanges and information through the sharing of a decentralized database. This eliminates the need for traditional intermediaries, as each node in the network holds an updated copy of the ledger, ensuring transparency and immutability of data.

In a blockchain, information is organized in blocks that are linked sequentially and protected by cryptography. Each block contains a set of transactions or data and a reference to the previous block, thus forming a continuous chain. This mechanism ensures that once data is added, it cannot be altered without the consent of the network, guaranteeing the integrity and security of the system.

Currently, this system is used for value exchanges through cryptocurrencies, supply chain management, smart contracts, and many other areas requiring secure and transparent records. Over time, an increasing number of experts from the finance and technology sectors have recognized the revolutionary role of blockchain. Don Tapscott, author and co-founder of the Blockchain Research Institute, stated: "Blockchain is the most important technology of our time. It represents the second era of the Internet, an Internet of value," thus emphasizing the importance of having a strategy to ride the new wave, after the wave missed by many entrepreneurs during the early 2000s Internet era. This statement was made by Tapscott during his TED Talk "How the Blockchain is Changing Money and Business", where he explores the transformative potential of blockchain in the economic and financial realms.

Secondly, it is essential to introduce and clarify the concept of Decentralized Finance (DeFi) and its mechanisms. As defined by A Ozili (2022), DeFi is described as the delivery of financial services via public blockchains and internet infrastructure. This broad framework includes all financial products and services developed on open-source, decentralized platforms, outside the control of traditional intermediaries.

Ozili highlights how DeFi contributes to financial inclusion, enables permissionless innovation, removes intermediaries, guarantees immutability of transactions, resists censorship, and facilitates cost-effective cross-border operations. At the same time, he emphasizes critical risks, such as smart contract vulnerabilities, legal uncertainty, data breaches, systemic interconnections, third-party reliance, and exposure to illicit activities.

Recent studies confirm and expand on these insights. For example, Schär (2021) explores how DeFi redefines the architecture of financial markets by replacing trust in institutions with trust in code. Similarly, Chen et al. (2022), in their paper "Defi Protocols and Systemic Risk", investigate potential contagion effects and liquidity risks emerging from protocol interdependencies within the DeFi ecosystem.

These contributions underline the need to critically assess both the transformative potential and underlying fragilities of DeFi, especially as its adoption spreads across emerging financial ecosystems.

Finally, Javaid et al. (2022)[4] describe decentralized finance (DeFi) as a valuable tool for enhancing authenticity, security, and risk management in financial and banking services, including credit management. Increasingly, institutions have recognized the potential of DeFi as an alternative channel for returns and income compared to traditional finance. Furthermore, the same paper highlights the need for DeFi within banking services and, more broadly, the financial sector. Given that the global financial system handles billions of transactions daily, this volume presents a significant challenge for financial infrastructures. Hence, it is important to emphasize how DeFi is envisioned in the coming years as a potential solution to the major inefficiencies and problems faced by large institutions and regulators.

In addition, the costs of stock markets are increased by the presence of stakeholders like regulators, brokers, stock exchange and more. Moreover, the essence of the decentralised management strategy is gaining effectiveness that may be increasing through the next years. Equity markets are getting ready to decentralise as a result. Blockchain technology makes it possible to conduct every type of investor-company interaction securely and without intermediaries, lowering expenses.

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[4] This citation corresponds to the content discussed in the section "Need of Blockchain" in the article*: A review of Blockchain Technology applications for financial services*.

The current study aims to fill a research gap by evaluating whether and how Italian SMEs can practically adopt DeFi tools to enhance liquidity management, diversify funding channels, and support strategic growth. The analysis builds on recent findings from the Global DeFi Adoption Index (Chainalysis, 2021), which shows that countries leading in DeFi usage also exhibit robust infrastructure for digital asset exchange and institutional participation.

The exploratory study applies a mixed-method approach, integrating expert interviews with a quantitative descriptive analysis utilizing a dataset extracted from DEX platforms, DeFi environments, and institutional sources, addressing topics such as ICOs, lost funds, and audits conducted on issued tokens metrics. It seeks to answer three guiding questions:

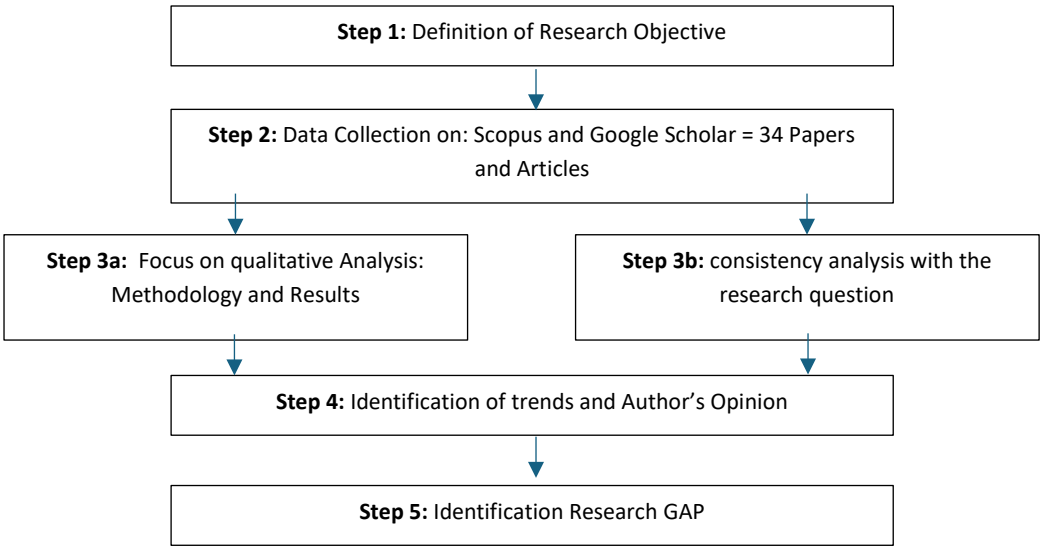
1. *How can SMEs leverage DeFi to access new sources of financing and optimize liquidity management?*
2. *What structural transformations can be observed in SMEs that adopt DeFi-based solutions, such as asset tokenization, stablecoins, and decentralized lending platforms?*
3. *What are the key regulatory and technological barriers hindering the implementation of DeFi in SME financing?*

This study contributes to the ongoing debate on alternative financing for SMEs by proposing DeFi as a complementary solution to traditional financial mechanisms. It emphasizes the need for enhanced digital and financial literacy among SME stakeholders and for institutional frameworks that can accommodate the emerging architecture of decentralized finance.

The remainder of this paper proceeds as follows. Section 2 outlines and discusses the methodology adopted in the study. Section 3 shows the key results of the analysis conducted through a mixed-method approach. Section 4 concludes the study, summarizing the key findings, discussing the managerial implications, and the limitations of the research.

Methodology. *We adopted a two-tiered methodological approach to explore the applicability of decentralized finance (DeFi) as a complementary financing mechanism for small and medium-sized enterprises (SMEs). The first phase consisted of a qualitative analysis, inspired by Ding (1994), based on semi-structured interviews with academics and financial professionals. These interviews aimed to assess the perceived feasibility of DeFi in the borrowing/lending segment for SMEs and to understand the level of awareness regarding DeFi-related technological and financial developments. This phase allowed us to capture insights into both opportunities and critical barriers to adoption, while also outlining conceptual directions for DeFi integration into traditional financial frameworks. The second phase involved a descriptive quantitative analysis based on data extracted from decentralized exchange (DEX) platforms, broader DeFi ecosystems, and institutional sources. This dataset included key variables such as trading volumes, token audit frequencies, ICO activities, and incidents of lost funds. By analyzing these indicators over a period of 5 to 10 years, we identified trends, patterns, and correlations that offer empirical grounding for evaluating DeFi's real and potential impact on SME financing, particularly in the context of macroeconomic challenges such as rising interest rates. The integration of qualitative and quantitative perspectives aimed to address a significant gap in the existing literature and stimulate awareness within both academic and professional communities.*

In accordance with the Qualitative analysis, the Methodological diagram is presented as follows:



The following diagram illustrates the research objective of the qualitative analysis, namely, to understand the presence or absence of academic material and studies carried out on the topic of the following paper. It was necessary to clearly define a framework in order to orientate the reader on the aims and approach of the study. The academic literature search was performed on Scopus and Google scholar, focusing on English and Italian language contributions within areas such as 'Business, Management and Accounting' and 'Economics and Finance'.

Subsequently, search strings[5] were used, such as:

(TITLE-ABS-KEY("decentralized financ") OR TITLE-ABS-KEY("blockchain") OR TITLE-ABS-KEY("alternative financ*") OR TITLE-ABS-KEY("fintech")) AND (TITLE-ABS-KEY(sme*) OR TITLE-ABS-KEY("small and medium*"))*

Criteria	Details
Objective	Literature analysis for a greater awareness of how academia approaches DeFI to the world of SMEs
Approach	Qualitative analysis (network visualization and review of individual paper characteristics)
Time Frame	All years up to April 2025
Language	English and Italian
Database	Scopus and Google Scholar (title, abstract, keywords)
Subject Areas	Business, Management and Accounting; Economics, Econometrics and Finance; Social Sciences
Final Sample Size	34 articles

The following table summarises the process about Review of the lecterature

In the existing literature (Aria & Cuccurullo, 2017; Xu et al, 2024), a comprehensive tool for conducting quantitative bibliometric research. The table reported below illustrates the current research gap by comparing two of the most comprehensive databases in the world, namely Scopus and Web of Science (WoS).

Tab. 1: Sample collected from major academic databases (WoS and Scopus), filtered according to specific search criteria related to "Decentralized Finance"

Search Query String	**WoS**	**Scopus**	***Total***
Title "Decentralized Finance"	459	1,327	*1,786*
Abstract "Decentralized Finance"	27,718	11,842	*39,560*
Year 2020-2024	4,889	3,933	*8,822*
Document Types: Article and Review	4,529	2,132	*6,661*
Language: English	4,175	2,099	*6,274*
Research Area: WoS and Scopus	1,453	610	*2,063*
Exclude: Publication Title with "Decentralized Finance"	1,231	590	*1,821*
Include: All Open Access	122	66	*188*

Based on the general framework outlined above, it is necessary to provide a more in-depth discussion of the results obtained from this literature review. Despite the considerable number of publications available on the topic of decentralized finance, the majority of them remain confined to a theoretical discussion, while studies that concretely address the application of DeFi as a peer-to-peer financing and investment tool are extremely rare-if not almost entirely absent. The research conducted using various search strings on the Scopus database confirms that only a limited number of published articles or papers analyse not only the benefits but also the operational and structural challenges of DeFi.

This observation is further supported by the fact that, within a sample characterised by a certain heterogeneity between research subject and the research question presented in this paper, out of approximately thirty articles, only three exhibit features that highlight critical issues or structural processes useful for applying decentralized finance to the credit system. In light of the above, the aim of this first step of analysis is to emphasise how insufficient and rudimentary the current research still is on topics that, in recent years, have seen a growing volume of use and practical demand. While it is essential to share the potential benefits of DeFi, it is even more crucial to express opinions and propose ideas on how to structure the use of a tool that, when placed in the hands of actors such as small and medium-sized enterprises, could support the economic growth of a country or even entire markets and sectors.

Results. *The findings reveal that DeFi has the potential to revolutionize financial accessibility for SMEs in multiple ways. SMEs can benefit from DeFi-enabled lending platforms, which facilitate peer-to-peer loans without the need for collateral typically required by banks. These platforms use smart contracts to automate lending agreements, reducing transaction costs and improving credit access (Filling the SME Credit Gap, 2023). Tokenization allows SMEs to convert real-world assets into digital tokens that can be traded on blockchain-based platforms. This innovation democratizes investment opportunities by enabling fractional ownership and broadening investor participation (Application to SMEs' Credit Platform, 2023). The use of stablecoins pegged to fiat currencies reduces transaction volatility and enhances cross-border payment efficiency. This is particularly beneficial for SMEs engaged in international trade, where traditional banking transactions may be costly and time-consuming (Decentralized Finance Research, 2022). By leveraging DEX platforms, SMEs can bypass financial intermediaries, reducing reliance on traditional banking infrastructure and associated fees. This fosters greater financial inclusion and enhances capital efficiency (Momtaz, 2022).*

In the following paragraphs, the results emerging from the study and the application of the adopted research methodology will be analysed. In particular, attention will be given to aspects such as the findings from the analysis of the existing literature, with the aim of understanding the current state of academic knowledge and the depth of theoretical reflections on the world of decentralized finance. Subsequently, the perspectives of both academic and professional

[5] Illustrative example.

practitioners will be examined, as their assessments provide a concrete viewpoint on the potential for DeFi adoption by SMEs. The critical contribution-marked by analytical capacity and expert judgement-offered by the interviewees will enable a realistic evaluation of the practical and everyday applicability of this new financial paradigm. Finally, the results obtained from the quantitative analysis of the dataset extracted from TORD will be discussed, with the objective of understanding the general trend in the use of DeFi and the corresponding challenges related to its applicability.

Qualitative analysis. *The following analysis has focused not only on the more general aspects of the DeFi system from an academic and theoretical standpoint, but more importantly on the challenges related to its use, in order to understand the true operational potential for the credit system in Italy and in countries that share a similar feature: a dense and extensive network of small and medium-sized enterprises at the national level.*

As a next step, through institutional contacts at the university and personal contacts, it was decided to broaden the scope of the research by including individual interviews on those topics that during the literature analysis appeared to be clearly insufficient and inconclusive for applicability in the day-to-day life of the SME credit system.

Regarding the opinion of experts from the banking world and academia, we decided to adopt an individual approach, as mentioned before, with interviews focused on the domain of practitioners. The central peculiarity of the interviews is to adopt an equal firing line. In other words, the goal is to understand the general perceptions and implementation challenges that interviewees identify regarding the use of DeFi in providing capital and financing for SMEs.

The interviews were structured with five main questions, which were branched out according to the nature of the practitioner according to the respondent's field of interest. For example, illustrative, if the interviewee was a banker, the questions targeted areas of interest, such as: the Italian and European credit system, regulations, opinion on the subject and how such a system would be implemented for small and medium-sized enterprises.

The pattern of questions explored and chosen, for a better understanding of the current framework, is structured as follows:

1. *Access to capital through DeFi: The ability of DeFi to emerge as an alternative to traditional finance channels is explored, with a focus on the advantages in terms of increased accessibility and financial flexibility for SMEs. In this first part of the interview, it is also asked how a peer-to-peer model can be approached in a credit system context.*
2. *Technological innovation and digital transformation: The question sets ask about the use of innovative technologies such as blockchain, tokenization, stablecoin, lending/borrowing platforms, DEX systems and digitisation tools (including artificial intelligence, open banking and credit scoring automation). The aim is to understand how much technology applications are currently taking place in the banking and traditional finance world and how much both financial intermediaries and retailers are inclined to use them.*
3. *Implementation process and operational requirements: In the following chapter of questions, there is an interest in definitions of the essential steps to create and implement a DeFi-based platform or process. Therefore, it is examined which elements and strategies are essential to start such solutions and which operational steps have to be considered to make the system scalable in the Italian context.*
4. *Barriers to adoption and structural criticalities: Both in the P2P context and in the adoption of DeFi in general, the main barriers - both structural (regulations, technological complexity, infrastructure) and behavioural (resistance to change, distrust of digital) - that may hinder the adoption of these financing models are analysed.*
5. *Managerial and strategic implications for SMEs: This theme includes both academic and economic perspectives as well as case studies and practical examples that show real change for SMEs (e.g. Binance and YoungPlatform S.p.A.). Consequently, the following thread is the discussion on how the adoption of digital and decentralised financial instruments can influence managerial decisions, business strategy and, ultimately, the competitiveness and organisational structure of SMEs.*

These thematic blocks highlight aspects that, as emerged from the literature review, represent an important research gap. The aim of the questions asked was to directly investigate the operational reality, gathering not only opinions, but also perceptions on the advantages and obstacles of adopting DeFi. This approach helped to more clearly delineate what the result, and thus the expected conditions, are for implementing DeFi to today's small business financing possibilities.

Considering the concepts discussed above, the questions designed and selected for this study-aimed at practitioners and academics operating in the financial sector-are as follows.

Tab. 2: Interview questions categorized by target group (Professionals vs. Academics) for the study on decentralized finance (DeFi) adoption in Italian SMEs

Target	No.	Interview Question
Professionals	1	*Considering the current macroeconomic framework-with new tariffs, geopolitical instability, and logistical challenges-what do you consider the fundamental strategic levers to support Italian SMEs?*
	2	*From the standpoint of open banking and automation, how can technology contribute to credit assessment, and what differences emerge in credit provision between micro/small enterprises and medium-sized firms?*
	3	*Based on your experiences, how would you evaluate the mindset of small Italian entrepreneurs towards adopting innovative technologies for capital sourcing?*
	4	*In a peer-to-peer system where decentralized financial sourcing enables interest-free monetary exchanges (thus reducing transaction costs), how would you assess the applicability of this model to the financing of Italian SMEs?*
Academics	1	*In the context of a P2P system, do you believe that applying DeFi to the financing of Italian SMEs can represent an effective alternative to traditional models? What advantages do you see in terms of access to capital and financial flexibility? What are the main structural barriers that could hinder its implementation? Are there any concrete examples (use cases) of SMEs that have already experimented with this approach?*
	2	*What are the essential elements to consider when implementing a DeFi-based financing platform for SMEs? From an academic and economic perspective, what are the principal managerial implications arising from the adoption of DeFi in SMEs?*
	3	*What phases do you consider essential for developing a process that facilitates SMEs' access to capital through DeFi? Are there ongoing experiments or notable case studies? Which strategies could make DeFi a scalable solution for the Italian entrepreneurial ecosystem? What specific barriers must SMEs address to adopt a DeFi-based model?*
	4	*From the enterprises' perspective, how is the adoption of blockchain and DeFi perceived? Are they primarily driven by innovation and competitive interests, or do they fear adoption-related risks? Which SME sectors appear most predisposed to integrate these technologies?*

Based on the premises just discussed, the overall framework of the responses provided by the interviewees deserves more in-depth analysis. According to the structure presented in Table 2, the first question addresses the strategic levers that could enhance financial and economic support for small and medium-sized enterprises (SMEs).

The feedback received from interviewees categorized under the "Professionals" target group is summarized as follows:

1. *Clear distinction between medium-sized enterprises and micro/small enterprises: As stated by one of the interviewees, co-founder of the Italian fintech bank, it is essential to make this distinction, as these categories have fundamentally different financial needs.*
2. *Focus on medium-sized enterprises: These firms tend to generate a more significant economic impact and, at the same time, require more structured financing solutions. The general consensus among the interviewees is that traditional capital markets, such as stock listings or bond issuance, are not always effective or accessible for this specific segment.*
3. *Potential strategic levers: Encouraging the expansion of pension funds through regulatory mechanisms that require them to allocate a share - even below 10% - to private capital. This idea was briefly reflected upon. Furthermore, the role of the state is considered crucial, as public institutions should facilitate a broader allocation of private capital in support of enterprise financing, overcoming the constraints and limitations that currently hinder greater private capital penetration.*

Moving on to the following two questions (questions 2 and 3), which are closely related-specifically, those concerning technology and automation in credit processes and the corresponding openness of entrepreneurs toward new technologies, several fundamental insights emerged that warrant particular attention. Firstly, with the advent of Artificial Intelligence (AI), all interviewees noted how the credit system has significantly accelerated, reducing not only costs but also the time required to deliver results. For micro and small enterprises, for instance, when applying for financing in the range of €200,000, the cost and time involved in analysing a business plan through traditional methods are often prohibitive. For this reason, the use of automated processes becomes essential to quickly assess creditworthiness without allocating excessive resources. In contrast, for medium-sized enterprises-which generally require funding in the order of millions more in-depth and tailored analysis is indispensable. In such cases, the human ability to interpret and evaluate a business plan remains vital, highlighting the value of professional experience and expertise. Secondly, contrary to initial expectations regarding entrepreneurs' approach to technological systems, the widespread use of technologies such as AI or online platforms (e.g., e-commerce)-especially following events such as the COVID-19 pandemic, the mandatory adoption of electronic invoicing, and the growing prevalence of personal digital tools (e.g., video conferencing, everyday use of tech services)-has been a key factor in confirming that entrepreneurs are indeed willing to embrace new technologies.

In summary, the data collected indicates that a cultural shift is underway. Small business owners are increasingly making use of digital tools not only for financial communication but also for financial management and access to capital.

To conclude with the questions addressed to the "professionals" target group, the final question focused on gathering professional opinions regarding the use of DeFi. Most of the interviewees initially expressed skepticism, as many believe the main difficulty lies in determining whether both peers involved possess the necessary skills to adequately and independently assess the financing and related investment. Furthermore, European regulations impose significant barriers, making decentralized finance less scalable for large-scale application. This highlights a major practical obstacle: the regulatory framework.

In addition to the insights provided by professionals, the questions posed to the interviewees identified as "Academics" (Table 2) yielded the following responses: Regarding the first question, the main advantages highlighted with respect to the application of DeFi in the credit system for SMEs include disintermediation and the ability to operate at any time, also reducing transactional costs (for instance, in international remittances, where fees can reach as high as 15-16%).

Based on these responses, a framework of potential benefits from this approach can already be inferred, as it facilitates direct lending and borrowing operations and allows for the bypassing of traditional financial channels, thereby improving access to capital. In this regard, the interviewees referenced examples in the banking sectors such as Revolut or N26-which have demonstrated that it is indeed possible to build an innovative financial ecosystem with substantial user bases and notable levels of capitalization. These examples bring to light an often-overlooked aspect of the research question: the concrete use of digitalization and decentralized technologies can constitute a valid alternative channel.

Regarding the second question-what the essential elements are-a general response can be summarized as follows. Several key points need to be addressed for the future implementation of DeFi. These include:

1. *Regulation and standardization: Platforms must comply with European regulations that have already begun addressing some critical issues-such as MICA, DORA, and the TPF (Third Party Framework). It is essential to determine whether to apply asset categorization criteria (e.g., EMTs, payment tokens, utility tokens, etc.).*
2. *Institutionalized intermediaries: Although the core idea of DeFi is decentralization, for an initial transactional phase, it is necessary to assess whether to involve a third party acting as a "clearing" intermediary between the parties.*
3. *Managerial skills and training: As previously mentioned in the interviews with "professionals," from a managerial perspective, there is a clear gap in the number of managers with the necessary skills to operate effectively within a decentralized finance context.*

The managerial implications identified through these interviews are examined more thoroughly in response to the third question. According to the interviewees, the managerial implications translate into the need to rethink the role of the manager, equipping them to utilize innovative tools and manage the transition from a traditional financial model to a digital and decentralized one. Furthermore, based on the opinions gathered, the limitless technological infrastructure, the transparency of the underlying assets, and systemic financial risks emerge as the most critical elements of decentralized finance.

From the perspective of the other peer-namely, the entrepreneur-question 4 reveals that firms still demonstrate a certain degree of caution towards new technologies and alternative processes for accessing capital. The main concerns highlighted are the fear of associated risks and the skills gap. Many companies remain wary of the volatility of digital assets and the lack of an established regulatory framework. Moreover, the inclination toward innovation also varies depending on the industry in which the small and medium-sized enterprises operate.

A noteworthy point to emphasize, once again highlighted during the interview, is that the prospective use of blockchain will not be limited to the financial domain but may also extend into the civil sphere. Blockchain technology could potentially become an integral component of data notarization systems, with significant implications for the civil sector economy.

Quantitative Descriptive Analysis: Data Evaluation and Trend Identification

In the Third section of this purely mixed analysis, the relative aim is to consolidate an approach that is also statistical. Or at least, an approach that gives the study a solid foundation. Accordingly, a database containing more than 6 thousand tokens stored from 2021 to the present was analysed. The following dataset was constructed by Paul P. Momtaz (Syracuse University - Whitman School of Management - Visiting Associate Professor). The Token Offerings Research Database (TORD)[6] consists of hand-collected ICOs, IEOs, and STOs. As of January 2021, the TORD is more comprehensive than any other publicly available token offerings database. The TORD partly resolves several issues with commercially available data, such as the pronounced survivorship bias.

An analysis of data from the Token Offerings Research Database (TORD) was conducted considering three main dimensions: geographical, temporal and economic-monetary. The choice to delve into these three areas responds to the need to provide a more articulated and coherent view of the phenomena related to the adoption and diffusion of DeFi. In particular:

1. *Geographical Element: the analysis focuses on an understanding of how DeFi is accepted and used around the world. As a first step, a cleansing of the data was performed, trying to understand first the trends of the continents that use it most. After that, the study went deeper, analysing which countries have the most interest in DeFi. The analysis was structured by calculating the number of tokens created in each country and respective continent, quantifying the respective percentage weight of the tokens' history in the database.*
2. *Temporal Element: In this section of the quantitative analysis, the common thread was the examination of the timeliness with which Initial Coin Offerings (ICOs) were launched and the evolution of their price over time. The main objective was to understand the frequency with which ICOs were launched and to analyse the average trend in offer prices to identify any recurring patterns or significant variations over the period considered.*

[6] Momtaz, P. (2024). *Token Offerings Research Database (TORD)*. Retrieved from https://www.paulmomtaz.com/data/tord.

3. *Economic-Monetary Element: As a final piece of this study in line with the previous analysis, an analysis was carried out on the collected capital of each token, quantifying the distribution of the collection according to the number of tokens. To this end, a descriptive statistical analysis was carried out, including the calculation of mean, median, percentiles (25th and 75th), standard deviation, as well as an analysis of the shape of the distribution through the skewness index and the kurtosis coefficient.*

After that, the study was implemented with an additional variable in play: the Lost Funds. The aim is to understand what is the peculiarity that created the loss and what are the related problems that create very high money losses (in view of an SME approaching the DeFi world with reduced power compared to those whale companies that move the market trend with a financial operation). Hence, a quantification of the number of problems that were listed and that have high money losses was carried out. To this step, a further fundamental step was added for a sample of these funds. That is, to compare the amount of loss with the market capitalization, creating a synthetic indicator for this study.

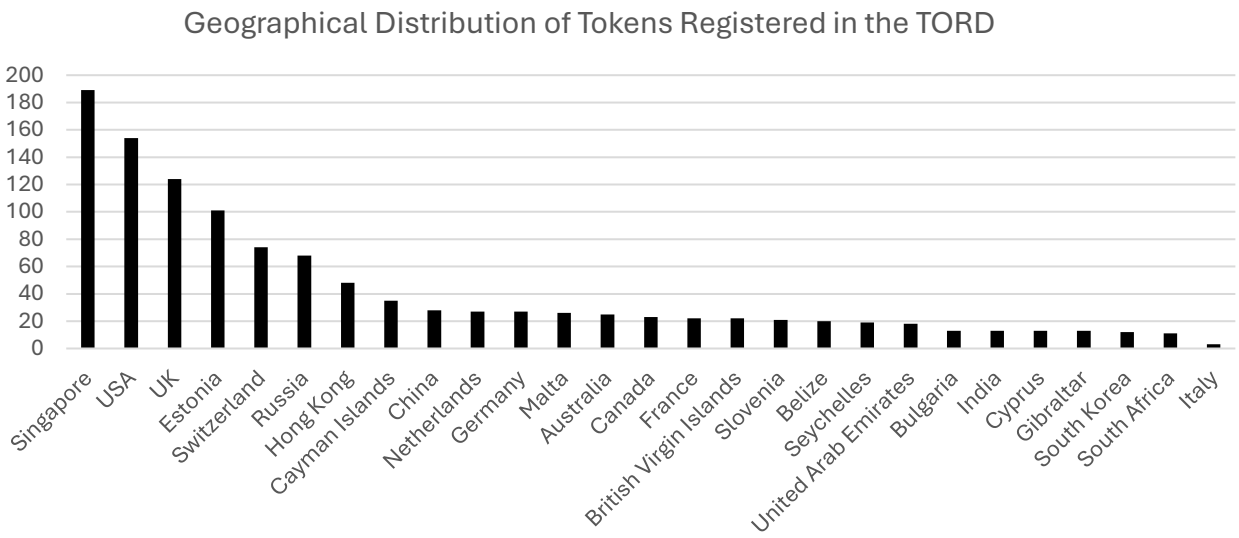
$$Lost\ Funds\ Ratio = \frac{Total\ Funds\ Lost\ by\ Token}{Token's\ Market\ Capitalization}$$

Based on the statistical-descriptive analyses conducted on the information contained within the TORD database, the following results were obtained. Firstly, the geographical analysis of the use of DeFi - through token ICOs - shows a high concentration in the Asian continent. In fact, the city-state of Singapore accounts for approximately 189 ICOs registered in the TORD. Only thereafter do countries such as the USA, the UK, and Estonia exceed the 100 ICOs mark. The latter exhibits a strong inclination towards technological and financial innovation.

It is quoted by a more successful blog Be(in)Crypto7 "Matis Mäeker, head of the Financial Intelligence Unit, emphasised the change. He emphasised the need for cryptocurrency companies to implement robust systems. These should resemble those of traditional banks, effectively safeguarding customers' assets."

The following chart provides a more detailed view of the top 25 countries characterized by a high number of token issuances through ICOs, as recorded in the TORD database. Additionally, Italy is included in the analysis, ranked 56th, with only 3 tokens registered in the dataset.

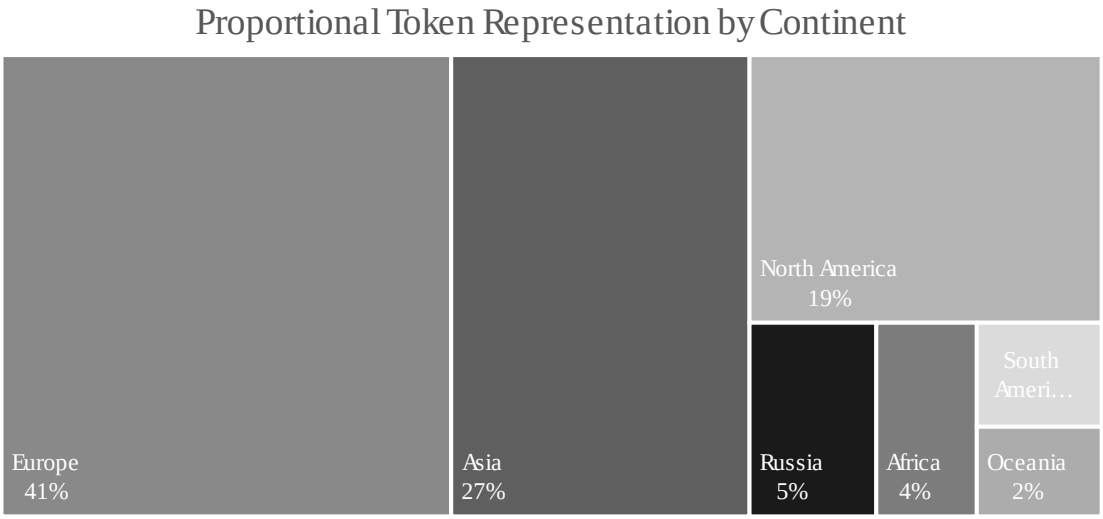
Chart 1. This bar chart shows the top 25 countries by number of tokens registered in the TORD via ICOs, with Italy (ranked 56th) included for comparison.



Below is the geographical distribution, broken down by continent. It is observable that Europe accounts for more than one-third of the tokens issued. This tree map illustrates trend misalignments when compared to the previously presented chart (Chart 1), which quantifies the tokens issued in individual countries.

7 Notariya, H. (2024, March 22). *Estonia approves crypto regulation while OKX exits India*. BeInCrypto.

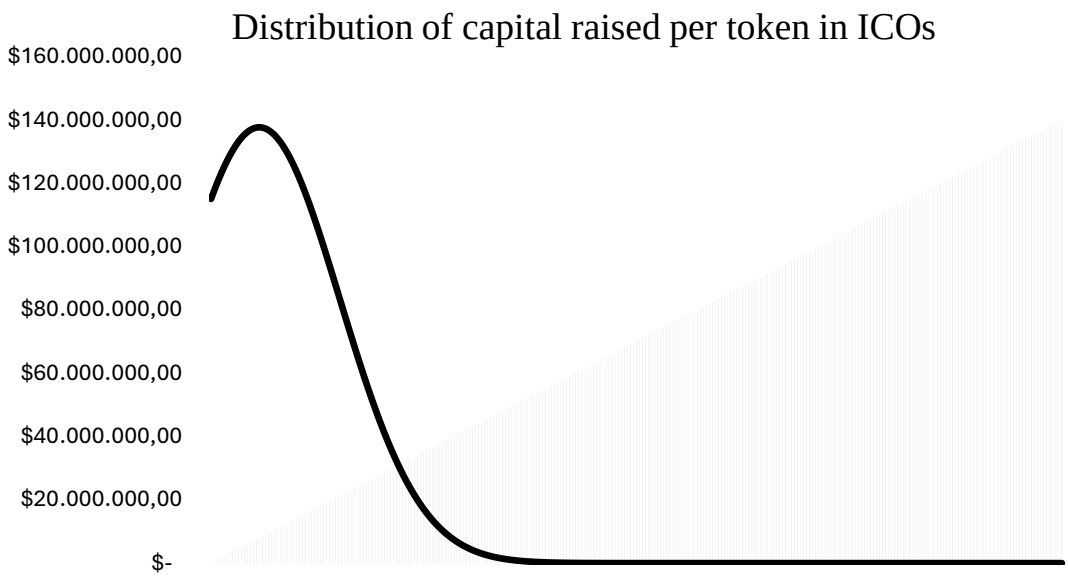
Chart 2. The treemap illustrates the distribution of tokens registered in the TORD across different continents. Each rectangle's size is proportional to the number of tokens associated with that continent, highlighting the regions with the highest concentration.



The following chart presents a frequency distribution of tokens by capital raised, which approximates a Gaussian (normal) distribution. It illustrates how the number of tokens varies across different capital-raising intervals.

The scatter plot shows that the capital raised tends to cluster just below USD 10 million. In particular, the mean and median are USD 7,935,512.95 and USD 3,433,235.00, respectively. Finally, the maximum capital raised and recorded is approximately USD 140 million, while the minimum is USD 189.

Chart 3. The chart shows how capital raised per token in ICOs is distributed, highlighting the most common funding ranges and variability across tokens



The following table shows with greater granularity the details regarding the distribution of capital in relation to token numbers and the percentage weight of the range, the latter being defined by various stress tests (through the calculation of various percentiles per cluster), in order to homogenise the ranges and calculate their relative weights in the total.

Tab. 3: Distribution of values in USD across different ranges, showing the absolute frequency, percentage within each range, and percentage of the total

Value Range (Usd)	Absolute Frequency (No.)	% Within Range	% Of Total
< 500K	226	16,69%	78,29%
500K - 1M	118	8,71%	
1M - 1.5M	104	7,68%	
1.5M - 2M	85	6,28%	
2M - 2.5M	56	4,14%	
2.5M - 3M	60	4,43%	
3M - 3.5M	40	2,95%	
3.5M - 4M	46	3,40%	
4M - 4.5M	31	2,29%	
4.5M - 5M	56	4,14%	
5M - 5.5M	28	2,07%	
5.5M - 6M	33	2,44%	
6M - 6.5M	26	1,92%	
6.5M - 7M	30	2,22%	
7M - 7.5M	15	1,11%	
7.5M - 8M	15	1,11%	
8M - 8.5M	17	1,26%	
8.5M - 9M	29	2,14%	
9M - 9.5M	6	0,44%	
9.5M - 10M	39	2,88%	
10M - 20M	161		11,89%
20M - 30M	76		5,61%
30M - 40M	24		1,77%
40M - 50M	11		0,81%
50M - 60M	8		0,59%
60M - 70M	2		0,15%
70M - 80M	3		0,22%
80M - 90M	1		0,07%
90M - 100M	4		0,30%
100M - 110M	0		0,00%
110M - 120M	3		0,22%
120M - 130M	0		0,00%
130M - 140M	0		0,00%
140M - 150M	1		0,07%
TOTAL	**1354**		***100%***

The following section analyzes- as referenced in the methodology chapter - the phenomenon of lost funds within the DeFi ecosystem, focusing on the most critical vulnerabilities that, in numerous cases, have led to substantial financial losses. These losses are often attributable to weaknesses, deficiencies, or outright failures in security mechanisms and control frameworks.

The table below presents the most significant categories of issues that have resulted in financial losses within the DeFi space. It provides a comparative view based on the number of incidents, the total amount of funds lost (in USD), and the relative weight (%) of each category. The data covers the period from January 2019 to April 2025.

Tab. 4: Summary of major DeFi-related exploit categories by type, number of incidents, total value lost (USD), and relative weight (%) for the period from January 2023 to April 1, 2025. The data was taken from https://de.fi/rekt-database

Type Of Issue	***Numerosity***	***Amount For Each Issue***		***Weight***
Exit Scam	15	$	54.432.189.570,00	72,45%
Rugpull	34	$	14.819.301.379,00	19,72%
Controllo accessi	3	$	2.325.000.000,00	3,09%
Access Control	51	$	1.583.783.758,00	2,11%
Exploit	45	$	828.956.877,00	1,10%
Borrowing	6	$	453.515.761,00	0,60%
Exchange	2	$	229.000.000,00	0,30%
Reentrancy	5	$	133.055.856,00	0,18%
Phishing	22	$	115.941.209,00	0,15%
Bridge	2	$	103.300.000,00	0,14%
Flash Loan Attack	21	$	37.314.861,00	0,05%
Borrowing	7	$	27.097.591,00	0,04%
Yield Aggregator	5	$	20.754.517,00	0,03%
Market Access	4	$	11.500.000,00	0,02%
Token Phishing	2	$	9.560.000,00	0,01%
Yield Aggregator	1	$	1.900.000,00	0,00%
Token Rugpull	1	$	1.600.000,00	0,00%
Token Other	1	$	1.563.286,00	0,00%

In view of the topic just addressed, it is necessary to present the results of a sample of losses that have occurred in the last two years approximately, in relation to the existing market capitalization. This data helps to understand not only the

critical issues and vulnerabilities that deserve attention, but above all how much the market value of a token can be volatile after a single event or a series of events.

Tab. 5: Selected cases of lost funds categorized by problem type and chain, showing the amount lost, date of the incident, and its impact relative to market capitalization.

Chain	Category	Problem Type	Funds Lost (USD)	Date	Market Cap (USD)	Weight (%)
CEX	CeFi	Access Control	$1,700,000	28/11/2024	$10,097,805.31	17%
XRP	CeFi	Access Control	$300,000,000	31/05/2024	$3,752,031,527.89	8%
ETH	DeFi	Exploit	$115,000,000	04/06/2023	$2,268,328,139.15	5%
PlusToken	CeFi	Rugpull	$2,900,000,000	16/12/2019	$524,140.61	553,30%

Conclusions. *This paper contributes to the emerging literature on DeFi by applying its principles specifically to SME financing. Unlike existing studies that focus on large corporations and institutional investors, this research examines the practical challenges and opportunities for small businesses. By bridging the gap between theoretical discussions and real-world applications, the study provides actionable insights for entrepreneurs, financial managers, and regulators. In light of the analyses conducted, the paper confirms the evident need for small enterprises to access capital through alternative channels, proposing a potential solution and assessing its applicability by analyzing the advantages and limitations of integrating DeFi into everyday operations. The evidence reinforces the persistent shortage of capital access for small-scale enterprises, with nearly one in four reporting such difficulties, in line with the European Investment Fund's annual report, highlighting the challenges small enterprises face, which collectively represent 98% of the European economy. Building upon the analytical foundation of the results section, it becomes clear that both qualitative analysis and descriptive-statistical investigation reveal the potential of decentralized finance to expand access to innovative financing solutions, not only for micro and small enterprises but also for medium-sized companies, which often require capital in the range of millions of euros.*

The table below illustrates how DeFi may support not only micro and small enterprises, but also medium-sized companies-as emphasized by one of the interviewees-who pointed out that medium enterprises often have capital needs in the range of millions of euros, in contrast to the tens of thousands typically required by smaller firms.

Tab. 5: This Table Explain how DeFi can support with a wide range of financed capital

	Results	Token's Name
Min Capital Raised	$ 189,00	SRX Token
Average capital raised	$ 7.935.512,95	
Max Capital Raised	$ 142.686.051,00	GXB

The study acknowledges limitations, such as limited empirical data on SME DeFi adoption, regulatory uncertainty, and the financial risks associated with DeFi market volatility. Future research should explore longitudinal studies on SME performance post-DeFi adoption and conduct deeper policy analysis to assess regulatory evolution. From a managerial perspective, integrating DeFi solutions requires training and education on blockchain and DeFi applications, as well as the development of risk management strategies to mitigate crypto volatility; strategic partnerships with blockchain-based financial service providers could facilitate technological adoption. Policymakers are encouraged to establish clear DeFi regulations to enhance legal certainty and investor protection, fostering a stable environment for SME engagement with decentralized finance. Interviews conducted with financial professionals and academics emphasize the need to create specific managerial competencies related to cryptoassets, decentralized finance, and blockchain basics, and underline the importance of regulating the DeFi system. Although the financial intermediary is not a natural component of DeFi, one interviewee notes that its use could be facilitated through the introduction of an intermediary acting as a clearinghouse for securities or money, suggesting that managerial implications could support the evolution of DeFi and its integration into the Italian and European credit systems, as seen in the example of Estonia.

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Dalla resilienza dell'imprenditore alla resilienza dell'impresa: intuizioni da un caso studio qualitativo

SONIA CATERINA GIACCONE[1] PASQUALE MASSIMO PICONE[2]

Abstract[3]

Le imprese hanno bisogno di sviluppare la capacità di resilienza per riuscire a superare crisi indotte da shock *esogeni. Sebbene molti studi riconoscano la resilienza personale degli imprenditori come un antecedente della resilienza d'impresa, i meccanismi sottesi alla trasformazione della resilienza degli imprenditori in resilienza organizzativa non appaiono ancora adeguatamente investigati. Attraverso l'analisi di un caso studio nel settore del turismo, questa ricerca mette in luce, in primo luogo, il ruolo degli eventi critici affrontati nella vita personale nel plasmare la resilienza di un imprenditore. Un riscontro ancora più interessante è rappresentato dall'aver notato che, nel caso in parola, le esperienze di vita avverse hanno aumentato anche la sensibilità dell'imprenditore verso le pressioni sociali e l'attenzione verso le altre persone, facilitando così il miglioramento delle relazioni con gli stakeholder interni ed esterni dell'impresa. Il nostro studio fa emergere come, in corrispondenza ad un evento esogeno avverso, la resilienza dell'imprenditore, come persona, abbia un valore potenziale, che diviene efficace nel "contagiare" e plasmare la resilienza d'impresa, quando si combina con relazioni forti con gli stakeholder dell'impresa.*

Framing of the research. *Eventi come recessioni economiche, guerre e pandemie rappresentano minacce significative per la sopravvivenza e le performance delle imprese (Iftikhar et al., 2021; Linnenluecke, 2017; Mihotić et al., 2023; Pal et al., 2014). Pertanto, nel corso della loro vita, le imprese devono sviluppare capacità di resilienza per affrontare questi shock esogeni, limitando i danni e - ove possibile - sfruttando le opportunità derivanti da nuove condizioni (Conz, Magnani, 2020). Il tema della resilienza ha suscitato un crescente interesse da parte degli studiosi di imprenditorialità, in particolare nel contesto delle piccole e medie imprese e delle imprese familiari (Calabrò et al., 2021; Conz et al., 2020; Santoro et al., 2021; Yilmaz et al. 2024), che sovente patiscono una carente disponibilità di risorse e una limitata capacità di gestire l'esposizione al rischio (Iborra et al., 2020; Pal et al., 2014).*

Un tema chiave nella letteratura di imprenditorialità è il ruolo cruciale degli imprenditori nel plasmare la resilienza d'impresa, nel trasferire convinzioni e sentimenti ad altri membri dell'organizzazione e nel guidare l'organizzazione (Su, Junge, 2023). Tuttavia, sebbene molti studi considerino la resilienza degli imprenditori come un antecedente chiave della resilienza d'impresa, i meccanismi che trasformano la resilienza individuale in resilienza collettiva dell'impresa non sono ancora ben compresi.

L'attenzione sulla resilienza - osservano Conz e Magnani (2020) - è cresciuta così significativamente, negli ultimi decenni. In generale, la resilienza si è affermata in letteratura come un concetto poliedrico (Munoz et al. 2023, p. 185); dunque, nel tentativo di chiarire il posizionamento di questo studio, noi facciamo riferimento alla resilienza come alla capacità di un'impresa di assorbire shock esterni (Dahles, Susilowati, 2015; Iborra et al., 2019; Ortiz-de-Mandojana, Bansal, 2016) e successivamente adattarsi a nuove condizioni (Korber, McNaughton, 2018).

In estrema sintesi, la letteratura sulla resilienza delle imprese si muove in tre direzioni principali. La prima direzione coinvolge studiosi che cercano di stabilire una tassonomia *di eventi avversi, classificandoli in base alla velocità con cui emergono, alla possibilità di sfruttare conoscenze ed esperienze passate nell'affrontarli e alla gravità dello shock esogeno (Su, Junge, 2023).*

La seconda direzione sottolinea la necessità di una concettualizzazione della resilienza come capacità dinamica *(Conz, Magnani, 2020). La natura dinamica della resilienza, a sua volta, è legata a tre fasi chiave. La prima è la capacità di resilienza proattiva, usualmente interpretata in letteratura come la capacità di anticipare a eventi imprevisti. La seconda fase è la capacità di* absorptive resilience*, che implica il mantenimento della stabilità delle performance o, più in generale, la conservazione delle risorse per sostenere le normali operazioni d'impresa (Bhamra et al., 2011). La terza fase implica la capacità di* riconfigurazione *della catena del valore, o di parti di essa, per ripristinare l'equilibrio a un livello uguale o migliore rispetto a prima.*

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La terza direzione della letteratura esamina gli antecedenti della resilienza d'impresa a vari livelli di analisi *(Aversa et al., 2024), inclusi imprenditori, imprese e* supply chain. *In generale, esplorando gli antecedenti della resilienza di un'impresa, la letteratura sostiene che la resilienza di un sistema umano dipenda dal contesto del sistema in esame (Wilson, Wilson, 2019).*

Data la nostra domanda di ricerca, che intende esplorare il ruolo cruciale degli imprenditori nel plasmare la resilienza organizzativa, ci concentriamo sulle dinamiche alla base della resilienza d'impresa, un aspetto che diventa ancora più critico per le piccole imprese che per le grandi imprese (Hadjielias et al., 2022). In particolare, la letteratura ha indicato caratteristiche individuali degli imprenditori - sia stabili sia soggette a cambiamento nel tempo -, che supportano la resilienza (Kovoor-Misra, 2020; Sommer et al., 2016). Tra le caratteristiche stabili ci sono tratti come narcisismo, avidità ed empatia (Su, Junge, 2023); le caratteristiche non stabili, d'altra parte, includono la hubris (Picone et al. 2025). L'idea fondamentale è che la resilienza degli imprenditori si materializzi in una forza motivazionale che guida l'azione collettiva in risposta agli shock esogeni (Williams, Shepherd, 2016). In nuce, *questa letteratura si basa su un argomento chiave: forti propensioni individuali, come la capacità di cercare diverse opzioni in circostanze difficili, la perseveranza, la gestione efficace di situazioni multiformi e la determinazione di soluzioni appropriate, si traducono dall'essere caratteristiche individuali dell'imprenditore al diventare una caratteristica collettiva dell'impresa (Hadjielias et al., 2022). Questo argomento sottolinea il ruolo delle risposte cognitive e comportamentali degli imprenditori a tali eventi (Lengnick-Hall et al., 2011; Shepherd et al., 2020). Empiricamente, Branicki et al. (2017) dimostrano che gli imprenditori, grazie alle loro precedenti esperienze che li hanno aiutati ad affrontare circostanze imprevedibili e difficili, tendono ad essere altamente adattabili e a sviluppare competenze che aiutano le piccole imprese a rimanere resilienti (Shepherd et al. 2020). Su e Junge (2023) sostengono che "la resilienza individuale può (ma non necessariamente) portare alla resilienza organizzativa" (p. 1093). Sulla base di questa revisione ragionata della letteratura, riteniamo di poter affermare che gli imprenditori possono svolgere un ruolo cruciale nel plasmare la resilienza d'impresa, seppur non sia ancora chiaro come la resilienza individuale dell'imprenditore possa influire sull'emergere di una capacità organizzativa.*

Purpose of the paper. *Questo articolo esamina il ruolo degli imprenditori nel dare forma e sviluppare la resilienza d'impresa, ovvero la sua capacità di adattarsi e rispondere agli shock esogeni. In particolare, ci concentriamo sugli antecedenti della capacità di resilienza cosiddetta di assorbimento (Bhamra et al., 2011; Conz, Magnani, 2020), non solo perché tale capacità è essenziale per preservare le funzioni principali e garantire la stabilità a breve termine (Grego et al., 2024) ma, cosa ancora più importante, perché sembra fungere da prima linea di difesa, gettando le basi affinché l'impresa esplori strategie adattive e trasformative in seguito. Inoltre, in questo contesto, il ruolo dell'imprenditore sembra essere particolarmente amplificato, data la sua capacità di implementare buffer e garantire risorse critiche (Conz et al., 2023). La nostra ricerca si basa sullo studio del caso Four Points by Sheraton Catania Hotel & Conference Center, durante la pandemia di COVID-19. Questo caso è particolarmente interessante per la decisione coraggiosa (quasi "eroica") e non convenzionale dell'imprenditore di fronteggiare la crisi pandemica mantenendo aperto l'hotel nonostante le ampie restrizioni imposte dal governo italiano nel periodo del lockdown.*

Attraverso un'analisi approfondita di questo caso, come in ricerche precedenti (Ayala, Manzano, 2014; Duchek, 2018; Lee, Wang, 2017; Pathak et al., 2024), identifichiamo il ruolo fondamentale degli eventi critici personali nel plasmare la resilienza di un imprenditore (nel nostro caso di una donna imprenditore). Ancora più interessante, tuttavia, è il fatto che evidenziamo che le esperienze di vita avverse aumentano la sensibilità di un imprenditore alla pressione sociale. Pertanto, gli eventi critici personali svolgono una duplice funzione: in primo luogo, come meccanismo che può influenzare le relazioni con gli stakeholder dell'impresa attraverso la percezione delle aspettative sociali; in secondo luogo, come un modo per sviluppare la resilienza degli imprenditori.

Methodology. *Gli studi qualitativi consentono un approccio di ricerca aperto (Bluhm et al., 2011) ed una comprensione approfondita delle ragioni e dei meccanismi attraverso i quali eventi e circostanze alla base della resilienza dell'imprenditore si svolgono lungo una traiettoria specifica e diventano resilienza d'impresa (Van de Ven, Huber 1990). Per questa ragione abbiamo intrapreso l'analisi di un caso studio (Eisenhardt,1989; Flyvbjerg, 2011; Gibbert et al., 2008; Yin, 2014), specificamente il caso del Four Points by Sheraton Catania Hotel & Conference Center, un hotel situato ad Aci Castello, in provincia di Catania, gestito dalla famiglia Laneri nel 1983. È un hotel 4* che si rivolge sia al segmento business che al segmento* leisure, *grazie alla sua posizione privilegiata sulla costa e all'accesso privato al mare. Per analizzare il nostro caso studio, abbiamo condotto interviste semi-strutturate ed utilizzato fonti secondarie, come informazioni da siti web e articoli di stampa. Abbiamo intervistato per prima l'imprenditrice, che è CEO dal 2014 e che ha reso possibile ricostruire scelte e azioni messe in atto per superare la crisi pandemica da COVID-19. Successivamente, sulla base della segnalazione dell'imprenditrice stessa e poi degli altri intervistati (usando la tecnica denominata "snowball"), abbiamo identificato gli stakeholder interni ed esterni dell'impresa da intervistare, tra cui il direttore generale della struttura, alcuni dipendenti (ad esempio, un barista e lo chef) e fornitori, che hanno contribuito a gestire la crisi pandemica. Intervistare gli stakeholder ha consentito di ricostruire, attraverso diversi punti di vista, le azioni e le dinamiche relazionali che hanno contribuito a rendere l'impresa resiliente nell'affrontare la crisi del COVID-19. In totale, per la ricerca ancora* in fieri, *abbiamo condotto 7, interviste semi-strutturate nel 2024, durate tra i 25 e i 70 minuti. Le interviste sono state registrate e trascritte. Talvolta, come nel caso dell'imprenditrice, sono stati effettuati più round di interviste per arricchire il quadro informativo o perfezionare le informazioni precedentemente acquisite aggiungendo ulteriori dettagli. Abbiamo creato uno schema-guida per la conduzione delle interviste, che è stato adattato in modo flessibile in relazione ai diversi intervistati e alle risposte ottenute (Gioia et al., 2013).*

I dati raccolti dalle fonti primarie e secondarie sono stati analizzati applicando il metodo di Gioia e colleghi (2013). Concentrando l'analisi del caso sul periodo circostante la pandemia di COVID-19, sono stati esplorati i fattori e i processi che hanno favorito lo sviluppo della resilienza dell'impresa. Dopo aver letto attentamente le interviste e gli altri materiali, abbiamo attuato una attività di codifica aperta e abbiamo identificato una serie di codici correlati a decisioni e azioni. Considerando insieme i concetti emergenti dalle interviste e la nostra conoscenza della teoria, abbiamo intrapreso una procedura di codifica assiale, in cui abbiamo identificato relazioni tra le categorie di codici aperti e li abbiamo raggruppati in temi più astratti. Infine, abbiamo aggregato i temi identificati in tre dimensioni principali, attraverso le quali spieghiamo teoricamente la resilienza d'impresa.

Il processo di raccolta ed elaborazione dei dati, ancora in corso, è teso ad assicurare una maggiore sistematicità e un più ricco livello di approfondimento dell'analisi; si presterà attenzione alla triangolazione delle fonti e ad una più ampia selezione degli stakeholder da intervistare.

Results. *L'analisi del caso, sebbene la ricerca sia ancora* in fieri, *ha mostrato che diversi eventi avversi hanno segnato la vita personale dell'imprenditrice e hanno contribuito a forgiare il suo atteggiamento e la sua resilienza. Ad esempio, l'impossibilità di intraprendere la desiderata carriera da regista, a causa del divieto paterno, se da una parte rappresentò una delusione importante, dall'altra non scalfì la sua passione, che la stessa imprenditrice sentì di avere realizzato gestendo la sua impresa "Quando gestisci un'impresa, sei un regista" (Imprenditrice). Un altro evento critico fu una crisi significativa nell'impresa di famiglia, che fece sentire l'imprenditrice in dovere di prendere la dolorosa decisione di abbandonare i suoi studi universitari in Architettura per tornare in Sicilia a dare il suo contributo in azienda. Se davanti alla difficoltà familiare l'imprenditrice sentì una forte pressione sociale che le fece anteporre la necessità di aiutare la sua famiglia al desiderio di realizzarsi completando il suo percorso universitario, nel tempo la sua passione per l'architettura e l'arte riuscì comunque a trovare appagamento. Ad esempio, dal 2017 l'imprenditrice dirige la Fondazione OELLE che si propone di valorizzare il patrimonio culturale e artistico creando nuove opportunità per giovani artisti. La passione dell'imprenditrice per l'arte è oggi evidente anche all'interno dell'hotel Fuor Points by Sheraton Catania, che ospita la fON Art Gallery, uno spazio che si sviluppa tra i diversi piani dell'hotel con mostre temporanee di artisti emergenti e opere provenienti dalla collezione della Fondazione OELLE. Gli eventi avversi, i lutti familiari e le sfide professionali affrontati nel tempo hanno allenato e forgiato l'atteggiamento resiliente dell'imprenditrice, rendendola più forte e pronta a reagire e gestire prontamente le situazioni difficili che potevano presentarsi. In relazione alla drammatica emergenza della pandemia di COVID 19, l'imprenditrice ha osservato come, sebbene non sarebbe stato possibile prevedere la crisi pandemica, il fatto di avere vissuto una "vita complicata" aveva stimolato il suo atteggiamento verso la resilienza facendola sentire pronta a fronteggiare nuove emergenze. L'aumentata resilienza personale e la sensibilità alle pressioni sociali hanno influenzato le scelte adottate per gestire l'impresa durante la pandemia, nonché il modo in cui l'imprenditrice ha gestito e coltivato le relazioni con gli stakeholder interni ed esterni. Ciò è dimostrato, ad esempio, dall'attenzione rivolta all'inclusività e all'equità di genere all'interno dell'impresa, nonché dalla cura e dal senso di responsabilità verso il benessere dei dipendenti e degli ospiti dell'hotel.*

Quando le restrizioni governative hanno limitato la mobilità delle persone in Italia, le prenotazioni hanno improvvisamente subito un rallentamento e molti clienti hanno richiesto rimborsi per le prenotazioni annullate. Considerata l'imprevedibilità della crisi pandemica, una decisione particolarmente critica e rischiosa per gestire l'emergenza fu quella di lasciare aperto l'hotel, anche contro il parere dei familiari. Tale scelta è stata fortemente motivata dalla pressione sociale percepita nei confronti dei dipendenti e dalla volontà di garantire protezione, salvaguardia, serenità e benessere di tutto lo staff. Nonostante il numero limitato di ospiti durante il periodo COVID, l'obiettivo primario era quello di offrire un ambiente accogliente e sicuro dove si potesse sviluppare un senso di comunità e relazione. Essendo l'unico hotel aperto in zona, ospitava avventori che per necessità dovevano mettersi in viaggio, in un periodo in cui era difficile trovare servizi aperti anche in autostrada. Per gli ospiti che arrivavano esausti, il Four Points by Sheraton Hotel "rappresentava l'ultimo baluardo dell'ospitalità" (Imprenditrice), dove poter trovare anche un pasto caldo. Per fronteggiare con successo le problematiche economiche legate alla crisi esogena dovuta alla pandemia, data la forte contrazione degli ospiti negli alberghi e i problemi economico-finanziari che inevitabilmente si sono presentati, l'impresa da una parte ha fatto ricorso alla cassa integrazione guadagni per sostenere economicamente i dipendenti, dall'altra ha intrapreso azioni volte a negoziare con i fornitori (ad esempio banche, fornitori di energia, fornitori di alimenti e bevande) condizioni di favore al fine di colmare il gap di liquidità. L'imprenditrice ha dichiarato di avere molto apprezzato l'ampia disponibilità ricevuta da diversi fornitori che, in virtù del rapporto di fiducia consolidato nel tempo e dell'affidabilità dimostrata dall'impresa, si sono resi disponibili a sospendere o rateizzare i pagamenti programmati. Ha inoltre ricevuto ampia disponibilità da parte delle banche ad aumentare la linea di credito per far fronte alla crisi di liquidità legata al crollo delle prenotazioni. D'altra parte, i fornitori intervistati hanno dichiarato come il rapporto di fiducia consolidato nel tempo e l'apprezzamento dei comportamenti dell'imprenditrice durante il periodo pandemico abbiano contribuito a stimolare la disponibilità nei confronti dell'impresa.

In realtà, implementare efficacemente la decisione di tenere aperto l'hotel è stato possibile grazie all'impegno e alla collaborazione degli stakeholder interni ed esterni all'impresa. Pertanto, coltivare le relazioni con questi stakeholder si è rivelato un fattore critico della resilienza dell'impresa. Inizialmente, la fiducia e l'amicizia tra l'imprenditrice e il Direttore generale hanno giocato un ruolo cruciale nel creare la giusta solidarietà e sinergia per andare avanti. Tuttavia, la disponibilità riscontrata da parte degli altri membri dello staff ad essere presenti in struttura è stata ampia e cruciale. Collaborare e facendo squadra per affrontare uniti il momento di difficoltà legato alla pandemia ha rappresentato, come

ammesso dagli stessi intervistati, la risposta diretta alla chiara percezione dell'atteggiamento di rispetto, attenzione e protezione che l'imprenditrice aveva dimostrato nei loro confronti.

Durante l'emergenza pandemica, l'imprenditrice ha intrapreso una serie di azioni volte a prendersi cura anche degli ospiti dell'hotel, al fine di creare e consolidare relazioni di fiducia che potessero contribuire alla resilienza dell'impresa. Data l'incertezza sulla fine della pandemia, ha inizialmente offerto ai clienti dei voucher da utilizzare in hotel in un altro periodo anziché rimborsarli per le prenotazioni cancellate. Ciò ha consentito di limitare i danni delle cancellazioni delle prenotazioni, mantenendo la possibilità di accogliere successivamente i clienti in hotel. Inoltre, avendo deciso di mantenere la struttura aperta, l'imprenditrice ha fatto in modo di renderla un luogo sicuro in attesa che la tempesta passasse. L'attenzione verso gli ospiti ha determinato scelte volte a garantire anche un soggiorno piacevole in termini di servizi offerti. A disposizione dei clienti vi era sempre una macchina per il caffè ma, al raggiungimento di un numero minimo di ospiti, veniva riaperto il bar. Allo stesso modo, quando erano occupate venti camere, veniva aperto anche il ristorante per garantire la cena agli ospiti dell'hotel e talvolta anche a chi alloggiava altrove. Per quanto attiene alla politica di prezzo, l'imprenditrice ha volutamente applicato prezzi bassi per il soggiorno in hotel, non considerando opportuno approfittare dell'emergenza e della necessità delle persone di soggiornare in hotel. Questa scelta ha contribuito a sottolineare un approccio fortemente orientato all'accoglienza delle persone e all'esigenza di coltivare la speranza, piuttosto che al mero interesse economico. Tutto questo ha favorito la creazione di relazioni amichevoli e di fiducia con i clienti ospitati in hotel, che si sono mantenute nel tempo, anche dopo la fine dell'emergenza pandemica. Alcuni clienti stranieri in particolare, rimasti bloccati in Italia con l'esplosione della pandemia, hanno soggiornato per lunghi periodi nella struttura, acquisendo una confidenza ed un rapporto amichevole, con lo staff e con l'imprenditrice stessa, fuori dal comune, e sentendosi di fatto "a casa". Anche un soggetto esterno, come il fornitore di bevande da noi intervistato, ha percepito il senso di responsabilità e protezione che l'imprenditrice dimostrava nei confronti dei dipendenti ed il clima familiare che si era creato all'interno dell'hotel, paragonabile alla cura dedicata alla propria famiglia e alla propria casa. Quanto sopra esposto porta a concludere che il consolidamento del rapporto con gli stakeholder esterni e interni media il ruolo delle pressioni sociali dell'imprenditore nell'attivazione della resilienza d'impresa. La gestione della crisi pandemica ha lasciato un'eredità molto positiva legata alla percezione dell'importanza di valorizzare le persone e le relazioni umane. Infatti, come affermato dal Direttore Generale, il COVID-19 ha enfatizzato l'attenzione alle persone. A questo proposito, lo stesso ha specificato come la necessità di affrontare insieme situazioni difficili, pesanti e dolorose avesse portato naturalmente a rafforzare i legami e l'unione tra le persone favorendo la consapevolezza del fatto che comunque si deve andare avanti, spiegando così le radici della resilienza. Il rafforzamento delle relazioni all'interno dello staff e con i clienti ha creato benefici anche nel periodo post-pandemia, come è testimoniato dalla più rapida ripartenza dell'attività dell'hotel, rispetto ad altre strutture ricettive del territorio, alla conclusione del periodo pandemico.

Research limitations. *Questo studio presenta alcuni limiti. In primo luogo, il modello proposto si basa su un singolo caso studio, e ciò può limitare la possibilità di estendere i risultati. Ad esempio, mentre i nostri risultati indicano che eventi personali avversi possono aumentare la pressione sociale percepita dagli imprenditori ed i conseguenti comportamenti per gestire le situazioni di crisi, è possibile che in altri contesti la reazione possa essere invertita. In secondo luogo, abbiamo analizzato un'impresa familiare e la letteratura esistente evidenzia le caratteristiche uniche di tali imprese, in particolare la loro enfasi sull'unità e sulla ricchezza socio-emotiva. Di conseguenza, i nostri risultati sono altamente specifici del contesto; pertanto studi futuri potrebbero esaminare le differenze nel modo in cui le pressioni sociali vengono percepite, all'interno di imprese familiari e non. Questa ricerca sarebbe oltremodo utile per fornire indicazioni operative replicabili. Similmente, ulteriori casi studio potrebbero considerare settori di ambito non turistico e individuare ulteriori buone pratiche replicabili.*

Managerial implications. *La principale implicazione che questo studio offre ai manager è rappresentata dall'importanza evidenziata delle relazioni con gli stakeholders interni ed esterni. Poiché gli stakeholders possono fungere da rete di supporto nei momenti di crisi o cambiamento, contribuendo alla sopravvivenza del business, la capacità dei manager di alimentare e sviluppare nel tempo relazioni di fiducia e commitment con tali interlocutori sia esterni che interni, rappresenta una leva fondamentale per affrontare e superare situazioni di crisi, come quella pandemica.*

La seconda riguarda la relazione tra resilienza individuale e resilienza d'impresa. Il nostro studio sottolinea come la resilienza personale dell'imprenditore possa tradursi in una maggiore resilienza dell'impresa. Un aspetto fondamentale emerso è il ruolo delle relazioni con gli stakeholder, che possono fungere da rete di supporto nei momenti di crisi o cambiamento, contribuendo alla sopravvivenza del business.

La terza implicazione riguarda la relazione tra esperienze passate e capacità interpretativa. Le esperienze precedenti degli imprenditori aiutano a migliorare la loro capacità di interpretare situazioni complesse e di prendere decisioni più consapevoli e coerenti con le aspettative. Questo suggerisce che la formazione e la riflessione sulle esperienze passate possano essere strumenti preziosi per accrescere l'adattabilità e la visione strategica dell'impresa.

Originality of the paper. *Attraverso l'analisi del caso Four Points by Sheraton Catania è stato possibile ricostruire le determinanti della resilienza d'impresa. Un'evidenza della nostra analisi è il ruolo significativo degli eventi avversi nella vita personale nel plasmare la resilienza imprenditoriale; ciò corrobora quanto osservato da studi precedenti (Bernard, Barbosa, 2016; Chadwick, Raver, 2020). L'analisi del caso ha fatto emergere come gli eventi avversi della vita personale dell'imprenditrice, abbiano forgiato la sua attitudine verso comportamenti resilienti, che poi è stata manifestata anche nell'ambito delle scelte adottate per condurre l'impresa durante la crisi pandemica.*

La capacità di affrontare con coraggio e perseveranza tali eventi si è rivelata determinante nelle decisioni coraggiose che sono state messe in atto per affrontare la crisi legata alla pandemia, come quella di mantenere aperto l'hotel nonostante le incertezze economiche, dando priorità al benessere dei dipendenti. Se, da una parte, l'analisi ha mostrato che gli eventi avversi possono rappresentare una spinta ad affrontare le sfide e coltivare capacità di adattamento, dall'altra parte, i nostri risultati hanno evidenziato come la resilienza imprenditoriale sia una condizione necessaria, ma non sufficiente da sola a determinare la resilienza d'impresa. L'indagine ha consentito di notare come la necessità di fronteggiare momenti di crisi nella vita personale abbia accresciuto la sensibilità dell'imprenditrice verso le pressioni sociali, motivandola ad adottare strategie miranti a curare e rafforzare le relazioni con gli stakeholder sia interni che esterni all'impresa. Ciò d'altra parte si è rivelato particolarmente importante perché ha sollecitato, negli stakeholders, comportamenti che, basati sulla fiducia, sono stati orientati alla disponibilità e collaborazione verso l'impresa. Ciò ha contribuito collettivamente all'efficacia delle strategie di resilienza dell'impresa, consentendo una rapida ripresa delle operazioni d'impresa al termine dell'emergenza pandemica. Il nostro studio di caso sottolinea quindi il ruolo fondamentale della resilienza dell'imprenditore nel plasmare la capacità di resilienza di assorbimento di un'impresa e nello stabilire le basi per la sostenibilità a lungo termine (resilienza trasformativa).

Key words: *resilienza dell'impresa; resilienza dell'imprenditore; pressioni sociali; relazioni; stakeholders.*

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Track 3
Intelligenza Artificiale nel Management

Ricombinazione di conoscenza e esternalità spaziali nel contesto dell'Industria 4.0 europea

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Abstract

L'articolo analizza il ruolo della ricombinazione di conoscenza delle imprese e degli spillover spaziali sulle tecnologie inerenti all'ambito di Industria 4.0 a livello di impresa. L'articolo analizza il ruolo delle conoscenze pregresse in materia di ICT delle imprese europee nel ricombinare coerentemente le conoscenze e nel brevettare le tecnologie inerenti all'ambito di Industria 4.0 e il ruolo degli spillover spaziali locali e interregionali. L'articolo utilizza un modello di regressione lineare a effetti fissi e un modello di regressione spaziale autoregressiva su 1521 imprese europee attive che hanno sviluppato brevetti I4.0 nel periodo 2011-2019. Scopriamo che le conoscenze pregresse in materia di ICT favoriscono la performance brevettuale delle imprese nelle tecnologie I4.0, mentre sono influenzate negativamente dalle esternalità spaziali interregionali.

Framing of the research. *Le tecnologie inerenti all'ambito di Industria 4.0 fanno riferimento alla crescente digitalizzazione, robotizzazione e automazione della fabbrica manifatturiera (Capello e Lenzi, 2021), sono diffuse tra i Paesi europei (Ciffolilli e Muscio, 2018) anche se la loro distribuzione rimane altamente disomogenea, con le capacità regionali che giocano un ruolo decisivo nel determinare se le regioni possono integrarsi con successo nelle nuove reti di produzione della conoscenza (Balland e Boschma, 2021). La rilevanza delle tecnologie inerenti all'ambito di Industria 4.0 nelle politiche industriali europee (Klingenberg et al., 2019; Reischauer, 2018) e il recente dibattito sulla sovranità tecnologica (Edler et al., 2023) hanno messo in luce la necessità di sviluppare competenze e capacità per sostenere sia la competitività nazionale che i processi di trasformazione. In quanto tale, le tecnologie inerenti all'ambito di Industria 4.0 possono essere considerate come lo sviluppo del sistema delle tecnologie dell'informazione e della comunicazione (TIC) (Nuvolari, 2019), sviluppo che è stato fondamentale per trasformare i sistemi socio-economici e favorire la crescita economica, attraverso l'incremento della produttività delle imprese (Hall, Lotti e Mairesse, 2013), e si è rivelato strumentale per lo sviluppo di tecnologie verdi (Corrocher e Ozman, 2020). Inoltre, la brevettazione delle TIC può innescare complementarità tra i diversi domini di utilizzo (Santoalha, Consoli e Castellacci, 2021) e complementarità tra le invenzioni e le applicazioni delle imprese (Frenken et al., 2012), portando alla ricombinazione delle conoscenze presenti all'interno delle imprese (Antonelli, Krafft e Quatraro, 2010) e alla diversificazione tecnologica (Montresor e Quatraro, 2017). Il concetto di ricombinazione è al centro di questo processo, in quanto l'innovazione non nasce in maniera isolata ma proviene dalla ricombinazione di conoscenze e tecnologie esistenti (Weitzman 1996, 1998). Ciò è in linea con la concezione più ampia degli studi sul ruolo della prossimità, in cui le nuove attività tecnologiche si basano sulle capacità esistenti e sulla base di conoscenze locali (Frenken e Boschma, 2007). Tuttavia, le ricerche precedenti non hanno studiato se e come la brevettazione delle TIC consenta alle imprese di ricombinare le conoscenze per sviluppare le tecnologie dell'Industria 4.0. Alcuni studiosi hanno studiato quali cluster di tecnologie inerenti all'ambito di Industria 4.0 rappresentano le GPT (tecnologie di uso generale) e la loro relazione con le tecnologie TIC, concentrandosi sull'analisi dei brevetti a livello di USPTO (Martinelli, Mina e Moggi; 2021; Lee e Lee, 2022). Altri studiosi hanno invece concentrato la loro analisi su dati a livello di impresa andando a studiare i cambiamenti organizzativi legati all'adozione di tecnologie inerenti all'ambito di Industria 4.0 (Cirillo et al., 2021) e la relazione positiva tra i brevetti di tecnologie inerenti all'ambito di Industria 4.0 e le performance delle imprese (Benassi et al., 2022) o analizzando soltanto specifiche tecnologie dell'Industria 4.0 (Igna e Venturini, 2023). Altri ancora hanno esaminato il legame tra TIC e Industria 4.0 tramite dati a livello regionale e i conseguenti effetti positivi di tecnologie inerenti all'ambito di Industria 4.0 sulla crescita economica regionale (Laffi e Boschma, 2021; Capello e Lenzi, 2023). Inoltre, il panorama dell'innovazione nelle regioni è caratterizzato da una distribuzione non uniforme, con le nuove conoscenze tecnologiche che tendono a localizzarsi all'interno di specifiche aree geografiche (Boschma, 2005). Le regioni possono essere viste come sistemi di*

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attori che rafforzano le risorse locali, compresa la conoscenza, che può fluire attraverso i confini organizzativi a causa della vicinanza geografica (Cantner et al., 2010). Gli effetti delle esternalità tecnologiche sulla capacità tecnologica di ciascuna impresa derivano dalle attività di Ricerca e Sviluppo di altre imprese localizzate nella stessa area (Antonelli, 1994). Inoltre, la conoscenza è caratterizzata dalla capacità di diffondersi attraverso canali sia intenzionali che non intenzionali (Antonelli and Colombelli, 2017), le sue ricadute non sono necessariamente confinate ai confini regionali (Boschma, 2005). La conoscenza esterna diventa quindi un importante input complementare per la generazione di nuova conoscenza (Antonelli e Colombelli, 2015), dove le esternalità di conoscenza interregionali di aree limitrofe danno forma all'innovazione (Boschma et al., 2017) che può derivare da brevetti e attività di Ricerca e Sviluppo svolte in regioni adiacenti (Moreno et al., 2005; Boschma e Ter Wal, 2007; Filippetti e Zinilli, 2023). Corradini, Santini e Vecciolini (2021) dimostrano che la prossimità spaziale è un fattore trainante dei flussi di conoscenza di tecnologie inerenti all'ambito di Industria 4.0 tra le regioni europee a livello NUTS-2. Tuttavia, la dipendenza spaziale può esacerbare effetti negativi come la rivalità di mercato e la competizione per il vantaggio tecnologico tra le regioni (Montmartin et al., 2018), che possono ridurre la performance innovativa delle regioni circostanti (Drivas, 2021) e limitare le opportunità di innovazione all'interno delle industrie high-tech (Byun et al., 2021). Sulla base di queste considerazioni, rimane una lacuna nella comprensione dei meccanismi precisi attraverso i quali le conoscenze pregresse in ICT influenzano le performance brevettuali delle imprese europee. Mentre la ricerca esistente ha esplorato la geografia disomogenea dell'Industria 4.0 e il ruolo delle capacità regionali nel cambiamento tecnologico, rimane incerto se i cluster di tecnologie nell'ambito dell'Industria 4.0 favoriscano l'innovazione a livello di impresa. Per colmare queste lacune, questa ricerca esamina le seguenti domande: quali sono gli effetti della conoscenza pregressa in TIC e delle esternalità spaziali, sia locali che interregionali, nelle performance brevettuali delle imprese europee che sviluppano tecnologie nell'ambito dell'Industria 4.0?

Purpose of the paper. *Lo scopo dell'articolo è quello di analizzare il ruolo che hanno i brevetti in TIC delle imprese europee nello sviluppare brevetti di tecnologie inerenti all'ambito di Industria 4.0 e il ruolo delle esternalità spaziali all'interno del contesto imprenditoriale europeo. La letteratura si è concentrata nell'investigare il ruolo delle TIC nello sviluppo delle tecnologie inerenti all'ambito di Industria 4.0 andando ad analizzare brevetti in ambito europeo (Xiao e Boschma, 2023) e statunitense (Martinelli, Mina e Moggi; 2021; Lee e Lee, 2022) e analizzando le ricadute economiche delle tecnologie inerenti all'ambito di Industria 4.0 all'interno delle regioni NUTS2 europee (Laffi e Boschma, 2021; Capello e Lenzi, 2023), ma senza analizzare questo fenomeno a livello di impresa. Nello specifico sviluppiamo 4 ipotesi di ricerca. Le prime due ipotesi si concentrano sul ruolo della conoscenza tecnologica prodotta dall'impresa nel favorire tecnologie inerenti all'ambito di Industria 4.0 e nello specifico come la conoscenza tecnologica sviluppata in ambito TIC in quanto antecedente di queste tecnologie (Nuvolari, 2019) può favorire il loro sviluppo. La prima ipotesi prevede che le imprese che hanno sviluppato brevetti in TIC hanno una migliore performance brevettuale inerente all'ambito di Industria 4.0. La seconda ipotesi si concentra sul ruolo della specializzazione in TIC del portafoglio brevettuale nel migliorare le performance brevettuali inerente all'ambito di Industria 4.0.*

La terza e quarta ipotesi si concentrano sul ruolo delle esternalità spaziali sulla brevettazione di tecnologie inerenti all'ambito di Industria 4.0. Ci concentriamo sullo studio delle esternalità spaziali tra imprese in base alla loro ubicazione a livello di regione NUTS3. Nello specifico ci concentriamo sull'effetto delle esternalità spaziali all'interno della stessa regione NUTS3 e tra diverse regioni NUTS3. La terza ipotesi dell'articolo si concentra sull'effetto positivo sulla brevettazione di tecnologie inerenti all'ambito di Industria 4.0 delle esternalità spaziali per le imprese ubicate nella stessa regione NUTS3, mentre la quarta ipotesi prevede l'effetto negativo delle esternalità spaziali sulle tecnologie inerenti all'ambito di Industria 4.0.

Methodology. *Verifichiamo le argomentazioni teoriche utilizzando un modello di regressione lineare a effetti fissi e un modello di regressione spaziale autoregressiva su un campione di 1521 imprese europee distribuite tra i Paesi dell'UE-28 che hanno depositato brevetti inerenti all'ambito di Industria 4.0 presso l'Ufficio Brevetti Europeo (EPO) nel periodo 2011-2019. Abbiamo recuperato i brevetti di tecnologie inerenti all'ambito di Industria 4.0 dal database REGPAT dell'OECD EPO basandoci sulla strategia di ricerca sulle tecnologie di Industria 4.0 fornita da Martinelli, Mina e Moggi (2021). In primo luogo, abbiamo raccolto 8000 brevetti legati alle tecnologie inerenti all'ambito di Industria 4.0 applicati da 2334 numeri identificativi distinti del richiedente (ovvero "Person_id") nel periodo 2011-2019. Per affinare la ricerca e concentrarci sulle domande di brevetto presentate da aziende europee, abbiamo applicato tecniche di text mining per escludere le università, le fondazioni, le associazioni, le organizzazioni di ricerca pubbliche e gli istituti pubblici dal set di dati. Di conseguenza, abbiamo individuato 1521 identificatori unici raggruppati a livello di impresa (ovvero: OECD Harmonised Applicant Names - HAN_id) relativi alle imprese dell'UE-28 che hanno depositato 8021 brevetti inerenti a tecnologie in ambito di Industria I4.0 nel periodo 2011-2019.*

Per analizzare se i brevetti nel settore ICT consentono alle imprese europee di sviluppare e brevettare le tecnologie I4.0, raccogliamo i brevetti legati alle TIC depositati presso l'EPO prima del 2019 per le 1521 imprese dell'UE-28 che hanno depositato brevetti EPO legati a tecnologie di Industria 4.0 nel periodo 2011-2019. Abbiamo recuperato i brevetti EPO legati alle TIC utilizzando la strategia di ricerca fornita da Inaba e Squicciarini (2017). Abbiamo quindi creato una variabile binaria che assume il valore 1 se l'impresa ha sviluppato almeno un brevetto EPO TIC nei 5 anni precedenti, e 0 altrimenti. 835 imprese su 1521 hanno depositato un brevetto legato alle TIC, quindi per mitigare l'endogeneità dovuta alla self-selection nelle domande di brevetto legate alle TIC ricorriamo a una variabile strumentale e implementiamo una funzione di controllo. Per trovare un variabile strumentale adatta, calcoliamo la media del vantaggio tecnologico rivelato (RTA) standardizzato nelle TIC per ogni regione NUTS 3 confinante con la regione NUTS3 in cui hanno sede le

imprese. La variabile strumentale misura la specializzazione nelle TIC delle regioni NUTS 3 limitrofe alle imprese, che può indicare la presenza di distretti industriali TIC e che possono guidare la propensione delle imprese a brevettare in tecnologie legate alle TIC, ma non influenzare il termine di errore di ciascuna impresa.

Inoltre, all'interno delle 835 imprese che hanno depositato un brevetto legato alle TIC, calcoliamo misure di specializzazione del portafoglio brevettuale per poter analizzare il ruolo svolto dalla specializzazione in specifiche TIC nello sviluppare tecnologie inerenti all'ambito di Industria 4.0.

Per stimare gli effetti delle esternalità spaziali, calcoliamo misure di centralità di rete degli autovettori tramite le matrici di contiguità spaziale tra le imprese del campione. La centralità degli autovettori si basa sul concetto che un nodo (ad esempio, un'impresa) è più centrale se è collegato ad altri nodi importanti. Quindi il calcolo della centralità dell'autovettore su una matrice spaziale ci permette di comprendere l'effetto di agglomerazione dell'industria legato alle tecnologie in ambito di Industria 4.0. Calcoliamo la centralità di rete degli autovettori su due diverse matrici spaziali m×m che raccolgono se un'impresa j è confinante all'impresa i: 1) una matrice spaziale che assume il valore 1 quando un'impresa j è localizzata all'interno della stessa regione NUTS 3 dell'impresa i, e 0 altrimenti; e 2) una matrice spaziale che assume il valore 1 quando un'impresa j è localizzata in una regione NUTS 3 contigua all'impresa i, e 0 altrimenti. Dopo aver calcolato la centralità degli autovettori di ciascuna impresa in entrambe le matrici spaziali, si ottengono due matrici m×m dove l'elemento generico g_ij delle matrici raccoglie la centralità spaziale degli autovettori dell'impresa i con l'impresa j≠i. Per analizzare se le prestazioni brevettuali nelle tecnologie I4.0 sono influenzate dagli spillover spaziali localizzati e interregionali, calcoliamo l'interazione tra le matrici degli autovettori e il numero di brevetti I4.0 presentati dalle imprese j≠i negli anni precedenti. Per comprendere il fenomeno nella sua interezza, forniamo un'analisi dell'eterogeneità dei brevetti inerenti alle tecnologie in ambito di Industria 4.0 andando ad analizzare nello specifico l'effetto dei brevetti TIC sui brevetti in ambito di Intelligenza Artificiale, Cloud Computing, 3D printing, Internet of Things, Additive Manufacturing, and Big Data/Industrial Analytics. Inoltre, all'interno del modello di regressione lineare a effetti fissi e del modello di regressione spaziale autoregressiva introduciamo delle variabili di controllo, come lo stock di brevetti, l'ampiezza tecnologica del portafoglio brevettuale e il numero di inventori per poter introdurre delle misure che possono catturare la capacità di assorbimento di conoscenza da parte dell'impresa (Cohen e Levinthal, 1990).

Results. *Questo studio potrebbe portare a nuove considerazioni sul tema dello sviluppo delle tecnologie nell'ambito dell'Industria 4.0 a livello europeo, in quanto aver sviluppato tecnologie TIC a livello di impresa negli anni precedenti potrebbe comportare una migliore performance brevettuale nelle tecnologie di Industria 4.0. Inoltre, una maggiore specializzazione brevettuale in TIC potrebbe portare ad un ulteriore incremento delle performance brevettuali in tecnologie inerenti all'ambito di Industria 4.0. L'analisi di eterogeneità tecnologica andrebbe a dimostrare nello specifico quale tecnologia in ambito di Industria 4.0 beneficerebbe maggiormente delle conoscenze pregresse in TIC interne all'impresa. Inoltre, la dimensione geografica e l'agglomerazione di imprese potrebbe comportare un miglioramento delle performance brevettuali potendo beneficiare di esternalità spaziali di conoscenza (Boschma, 2005) nonostante questo effetto sia prevalentemente localizzato all'interno della singola regione NUTS3 comportando quindi esternalità negative di conoscenza tra regioni NUTS3 limitrofe, quindi limitando le opportunità di innovazione all'interno dell'Industria 4.0 europea (Byun et al., 2021).*

Research limitations. *Questo studio comporta alcune limitazioni. In primo luogo, si concentra su imprese fornitrici di tecnologia quindi i risultati non possono essere estesi alle imprese che adottano tecnologie nell'ambito dell'Industria 4.0. Inoltre, questo studio utilizza soltanto i brevetti depositati presso l'Ufficio Brevetti Europeo andando quindi a sottostimare l'effetto generato dalla brevettazione in uffici brevettuali nazionali. Allo stesso modo, i brevetti sono una misura ampiamente utilizzata dell'innovazione (Block et al., 2025; Nagaoka et al., 2010; Encaoua et al., 2006), ma potrebbero non cogliere appieno tutte le forme di attività innovativa, come i progressi tecnologici non brevettabili. La ricerca futura potrebbe incorporare molteplici uffici brevettuali e ulteriori misure di innovazione. Infine, il nostro studio va ad analizzare soltanto un'unica dimensione di trasmissione di conoscenza, ovvero quella geografica, mentre futuri lavori potrebbero approfondire il ruolo di esternalità di conoscenza provenienti da altre dimensioni, come quella tecnologica e quella inerente alle competenze.*

Managerial implications. *L'articolo ha importanti implicazioni per managers e imprenditori di imprese europee che vogliono investire nello sviluppo di tecnologie inerenti all'ambito di Industria 4.0. Da un lato, le imprese dovrebbero possedere conoscenze tecnologiche pregresse in TIC per poter avere migliori performance brevettuali di tecnologie inerenti all'ambito di Industria 4.0. Dall'altro lato l'ubicazione geografica comporta benefici allo sviluppo di queste tecnologie, potendo beneficiare delle esternalità spaziali di conoscenza. Questo risultato indica la presenza distretti industriali di tecnologie inerenti all'ambito di Industria 4.0 a livello europeo che permettono uno scambio di conoscenza tra le imprese fornitrici di queste specifiche tecnologie.*

Originality of the paper. *L'articolo contribuisce alla letteratura colmando un gap nella letteratura andando ad investigare il ruolo delle conoscenze tecnologiche in TIC presenti all'interno delle imprese europee nello sviluppare brevetti inerenti alle tecnologie nell'ambito dell'Industria 4.0, mentre studi precedenti hanno sviluppato analisi a livello brevettuale e regionale. Inoltre, contribuiamo alla letteratura inerente alle esternalità spaziali andando ad analizzare l'effetto di esternalità spaziali localizzate e interregionali a livello di impresa, mentre la letteratura precedente si è concentrato sul ruolo delle esternalità a livello di regionale NUTS2 e NUTS3.*

Keywords: *Industria 4.0; Conoscenza; Esternalità spaziali; Specializzazione; Unione Europea;*

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La diffusione della Marketing Automation tra gli e-tailer italiani: risultati da una cluster analysis

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Abstract

Il presente studio si propone di indagare il fenomeno della diffusione delle tecnologie di Marketing Automation tra gli e-tailer italiani, cercando di identificarne i diversi livelli di adozione. Sulla base di una review della letteratura è stata constatata l'assenza di scale validate che adottino la prospettiva aziendale e sono state identificate delle determinanti - sotto forma di variabili categoriche - successivamente testate attraverso una Latent Class Analysis. L'esito della ricerca, costruita su dati raccolti da 436 e-tailer italiani appartenenti a vari settori, identifica quattro cluster, ciascuno dei quali manifesta un differente livello di adozione della Marketing Automation nonché un diverso indirizzo strategico nel loro utilizzo, e pone le basi per futuri approfondimenti relativi alle determinanti dello status quo identificato.

Inquadramento della ricerca. *La Marketing Automation è un fenomeno di integrazione tecnologica attraverso una piattaforma software, che permette un arricchimento dell'esperienza del cliente, in varie fasi della sua customer journey. Nonostante non esista una definizione accademica condivisa della Marketing Automation, alcuni tra i suoi elementi sono condivisi all'unanimità, quali la compresenza di tool tecnologici e processi strategici interni all'impresa, orientati al conseguimento di obiettivi specifici (Buttle & Maklan, 2019) e l'orientamento ad una maggiore efficacia ed efficienza della gestione delle relazioni con il cliente attraverso molteplici canali (Biegel, 2009).*

Da un lato, guardando alla Marketing Automation da una prospettiva manageriale, questa offre la possibilità di gestire e replicare processi di marketing mantenendo un elevato livello di controllo contenendo i costi e riducendo i tempi di esecuzione, fino all'attivazione di processi e iniziative simultanee su più canali. La raccolta e l'analisi dei dati, inoltre, consente all'azienda di attivare un processo di apprendimento continuativo in merito ai propri clienti, attraverso un arricchimento progressivo dei loro profili, potendo al contempo correggere le iniziative di marketing future sulla base dello storico degli esiti (Buttle, 2009), Dall'altro lato, adottando la prospettiva del consumatore, l'introduzione di tecnologie di Marketing Automation, permette di migliorare la relazione con il proprio cliente, singola interazione dopo singola interazione e anche in real-time, riuscendo a costruire un rapporto di fiducia duraturo (Kantrowitz, 2014),

Uno dei fulcri della Marketing Automation è la possibilità di fornire automaticamente una personalizzazione del servizio offerto al cliente in logica one-to-one, per soddisfarne le esigenze specifiche (Jarvinen and Taiminen, 2016; Hanssens and Pauwels, 2016), Tale personalizzazione, su scala individuale, riguarda in primo luogo i contenuti condivisi con il cliente: infatti, messaggi pertinenti e personali aumentano la probabilità di essere aperti e consultati con attenzione, influenzandone quindi l'efficacia (Petty & Cacioppo, 1986), La personalizzazione può essere poi estesa anche ad altri aspetti del marketing mix, ad esempio nell'ottica di offrire promozioni personalizzate o suggerimenti di prodotto mirati a conseguire obiettivi di cross-selling o di up-selling (Changchien et al., 2004; Goshal et al., 2021).

Nonostante l'importanza della personalizzazione nella cura della relazione con il cliente, non esistono scale validate o altri metodi di misurazione oggettiva del livello di automazione adottato, per una diagnostica a livello aziendale. Tale aspetto, tuttavia, è estremamente rilevante, dal momento che ci sono vari aspetti sottostanti che determinano l'applicazione efficace della Marketing Automation. In tal senso, alcuni approcci hanno cercato di schematizzarne le principali funzionalità ed elementi costitutivi: ad esempio, Buttle e Maklan (2019), propongono una sintesi di 24 funzionalità riclassificabili in "funzioni di marketing", "processi interni abilitanti" e "marketing analytics", Mero et al. (2020) ne identificano cinque ambiti di applicazione: customer knowledge, sistema informativo di marketing, analitiche, change management e trasferimenti di conoscenza interdipartimentali.

Un'ulteriore schematizzazione, da noi proposta nel presente studio, guarda invece alle dimensioni-chiave che abilitano ciascuna fase di un processo di automazione.

In primo luogo, la Marketing Automation richiede un efficace sistema di identificazione di ciascun consumatore-utente e il tracciamento dei loro comportamenti online (es. pattern di navigazione sul sito e-commerce, metriche di web analytics) attraverso l'uso di cookies e indirizzi IP. Tale tracciamento, inoltre, è prolungato nel tempo, e può essere

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esteso anche ad altre piattaforme o canali (es. integrazione con i social media), opportunità ulteriormente semplificate grazie all'emergere dell'intelligenza artificiale (Jarvinen e Taiminen, 2016).

La raccolta del dato costituisce pertanto la base fondamentale per le attività di Marketing Automation, che possono combinare due diversi approcci. L'approccio attivo è costituito da un'interazione diretta con il cliente, al quale viene rivolta una domanda esplicita per verificarne l'interesse verso un argomento o un servizio: ne sono esempi i contenuti interattivi collegati ad ulteriori link associati, oppure short surveys costituite da un'unica domanda. L'approccio passivo, invece, consiste nell'utilizzo di informazioni raccolte precedentemente, nel corso di visite o acquisti effettivi, ed è basato su un'analisi di tipo predittivo (Montgomery e Srinivasan, 2003),

Lo step successivo riguarda l'analisi del dato, che comprende le tecnologie utilizzate per l'analisi, la complessità delle analisi svolte, l'integrazione di dati raccolti anche tra molteplici canali, ed infine la definizione di criteri di segmentazione avanzati. A questa, e sulla base di questa, si sussegue poi la messa a punto dell'attività automatizzata, che può differire a seconda dell'obiettivo strategico e della fase del customer journey nel quale è collocata (es. dall'acquisizione al re-marketing al post-vendita) (Davenport and Phillips, 2016),

Date le numerose complessità emergenti per ciascuno di questi stadi, l'assunto su cui si fonda il presente studio è pertanto che esistano diverse modalità mediante le quali le aziende attuano le attività di Marketing Automation e che quelle in grado di concretizzarle in maniera consapevole, sfruttandone pienamente le potenzialità siano soltanto un numero ristretto. Si ipotizza, infatti, che non tutte le aziende siano in grado di predisporre un ciclo virtuoso dalla raccolta del dato alla messa a punto delle attività, operando con un raggio di azione più limitato: ad esempio, limitare le azioni automatizzate alla sfera della comunicazione senza riuscire a coltivare effettivamente una relazione con il consumatore. Altro aspetto che riteniamo estremamente rilevante in tal senso è il grado di controllo che l'azienda è in grado di esercitare sopra le attività di Marketing Automation, attraverso lo sviluppo di conoscenze e competenze interne rispetto all'outsourcing parziale o totale.

L'evoluzione delle tecnologie abilitanti per le attività di Marketing Automation sta rapidamente avanzando grazie all'intelligenza artificiale, che ha non soltanto migliorato l'ottimizzazione delle funzioni di marketing, ma ha modificato le preferenze dei consumatori relativamente alle esperienze d'acquisto nonché i loro processi decisionali (Langer e Landers, 2021), E' pertanto utile chiedersi quanto gli e-tailer siano oggi preparati ad accogliere questa nuova rivoluzione tecnologica sulla base del loro livello attuale di adozione delle tecnologie di Marketing Automation.

Obiettivo del paper. *Il lavoro tenterà di misurare il grado di adozione e di conoscenza delle soluzioni tecnologiche di Marketing Automation da parte degli e-tailer italiani attraverso la presenza di una serie di condizioni identificate tramite review della letteratura e consultazione con esperti dell'ambito. La fase iniziale del lavoro, qui presentata, identifica l'esistenza di emersi diversi gradi di adozione e consapevolezza nell'utilizzo delle tecnologie di Marketing Automation, distinguendo gli e-tailer italiani in cluster costruiti sulla profondità e ampiezza delle attività automatizzate.*

La ricerca, tuttora in fase di sviluppo, pone le basi per un ulteriore approfondimento mediante interviste qualitative a sotto-campioni rappresentativi di ciascuno dei cluster fin qui identificati, al fine di raccogliere ulteriori informazioni in merito a barriere e stimoli all'adozione delle tecnologie e pratiche di Marketing Automation.

Metodologia. *I dati sono stati raccolti mediante questionario online condotto su un campione rappresentativo di imprese italiane che vendono i propri prodotti online ai consumatori finalia, tramite marketplace o sito proprietario, tra i mesi di Marzo e Maggio 2024. E' stata adottata una metodologia CAWI (Computer-Aided Web Interview), con assistenti di ricerca a disposizione per rispondere ad eventuali dubbi e domande degli intervistati. Il campionamento è avvenuto su base probabilistica, attraverso campionamento stratificato per area geografica e settore, identificato tramite codice ATECO. Il questionario è composto da tre sezioni. La prima, di natura descrittiva, ha permesso di verificare la rappresentatività del campione oltre che di raccogliere dati utili alla profilazione dei partecipanti; in questa sede si è inoltre verificato che i rispondenti operassero in un mercato esclusivamente o prevalentemente B2C.*

La seconda sezione è stata invece dedicata alla raccolta di dati inerenti il sito e-commerce e la sua gestione (proprietà del sito / della piattaforma, tipologia e volumi di prodotti venduti, ecc), Inoltre, all'interno di questa sezione, è stato chiesto ai partecipanti di indicare le attività di marketing automatizzate al momento della risposta.

La terza e ultima sezione ha infine raccolto ulteriori dati relativi al modo in cui vengono svolte tali attività, al fine di determinare il livello effettivo di automazione. Gli argomenti affrontati includevano infatti: la raccolta e la gestione del dato di cliente, incluso il suo comportamento sul sito web; l'utilizzo di sistemi di segmentazione, semplici o avanzati; l'utilizzo di sistemi di lead generation; il grado di personalizzazione delle e-mail inviate; l'integrazione dei canali di comunicazione; ed infine la gestione interna o in outsourcing delle automazioni.

Data la natura esplorativa del lavoro, e le difficoltà già evidenziate nell'identificazione di una scala validata, sono state utilizzate prevalentemente variabili categoriche, impiegando domande a scelta singola o multipla, con l'esclusione di alcune scale single-item per chiedere l'auto-valutazione relativamente ad alcuni aspetti (es. la soddisfazione rispetto alle competenze interne all'azienda in termini di Marketing Automation), In considerazione di tale struttura, per l'analisi dei dati è stata svolta una Latent Class Analysis (di seguito LCA), La LCA è una tecnica statistica di clustering, ampiamente utilizzata nelle scienze sociali, per segmentare una popolazione controllando per la sua eterogeneità andando a classificarli in gruppi sulla base della probabilità di appartenenza (Haughton et al., 2009), Nella LCA i cluster, o sottogruppi, di casi vengono identificati in base alle variabili interne, che qualificano i segmenti latenti di casi all'interno della popolazione; la stima della probabilità di appartenenza ai segmenti può essere poi ulteriormente affinata inserendo ulteriori variabili indipendenti, o covariate.

Risultati. *Il campione è costituito da 436 imprese italiane, appartenenti a 35 settori differenti: tra questi, i più rappresentati sono abbigliamento (25,9%), alimentare (18% incluso il comparto delle bevande), oreficeria e accessori (8,3%) e cosmetica e prodotti di bellezza (8%), Le imprese partecipanti sono collocate per il 43,8% al Nord Italia, per il 29,1% al Centro e per il 26% al Sud e nelle isole. Si tratta per la maggior parte di piccole-medie imprese: il 44,3% impiega da 0 a 9 dipendenti e il 28% da 10 a 49 dipendenti; inoltre, il 41,3% ha un fatturato inferiore ai 2 milioni di euro annui e opera principalmente all'interno dei mercati locali (31,6%) o italiani (57,3%),*

Ulteriori dati di interesse riguardano l'attività di e-commerce svolta: il 61,9% utilizza piattaforme di E-Commerce proprietarie, mentre il 32,6% utilizza sia siti propri sia marketplace; solo il 3,2% opera invece esclusivamente sui marketplace e il 2,3% utilizza strumenti differenti, come ad esempio Google Shopping. Il 67,7% vende prodotti di propria produzione, monomarca (46,8%) o multibrand (20,9%); il 47,5%, invece, è un e-tailer puro e opera come rivenditore, prevalentemente con molteplici marche. Questa suddivisione si riflette anche nei numeri relativi ai prodotti: infatti, il 50,7% dei rispondenti rende disponibile sul proprio e-commerce una gamma inferiore a 500 prodotti; il 35,5% arriva alla soglia dei 10.000 e solo il 13,8% riesce a superarla.

La grande maggioranza degli e-commerce ha come target principale il mercato italiano (67%) o locale (14%); ad ogni modo, gli e-tailer dimostrano di sfruttare questo canale anche per attrarre ulteriori vendite dall'estero. Sono infatti il 64,4% coloro che segnalano quote di mercato in altri Paesi Europei ottenute grazie all'e-commerce, e il 34,8% quote extra-UE. Ciò emerge anche dalla struttura dell'e-commerce: il 58,3% dei siti, infatti, ha una versione in lingua Inglese e il 26,1% prevede ulteriori lingue europee (Francese, Spagnolo e/o Tedesco), L'82% dei rispondenti, ottiene inoltre un buon riscontro in termini di traffico, superando i 5.000 visitatori al mese.

Un ultimo dato riguarda il tempo trascorso dal lancio dell'e-commerce: il 58,5% dei partecipanti ha attivato il canale di vendita online da più di 5 anni, e il 20,2% da 3 a 5 anni; il 21,3%, invece, opera online da meno di 3 anni, dei quali il 3,9% ha iniziato con l'attività di e-commerce da meno di un anno al momento della risposta.

Guardando alle attività di marketing automatizzate, è stato chiesto ai rispondenti di indicare quanto da loro svolto, a partire da una lista individuata sulla base della letteratura e di casi pratici. Il dettaglio viene riportato in tabella 1: si può rilevare come, tendenzialmente, tutte le attività siano più o meno presidiate; vi sono però notevoli variazioni nel numero di attività svolte - e nelle combinazioni di attività. Ad esempio, il 33,2% dei rispondenti svolge solo una tra le attività di automazione proposte, mentre solo il 12,8% riesce ad attivarle tutte.

Tab. 1: Dettaglio delle attività di Marketing Automation svolte

ATTIVITA' DI MARKETING AUTOMATIZZATE	FREQUENZA	PERCENTUALE
Invio di mail di benvenuto	261	59,9
Messaggi post-vendita	225	51,6
Invio di mail per i carrelli abbandonati	213	48,9
Attività di remarketing	190	43,6
Suggerimenti di prodotti correlati	188	43,1
Promozioni personalizzate	172	39,4
Lead nurturing / raccolta di contatti	147	33,7
Altre attività	20	4,6

Fonte: nostra elaborazione.
Le risposte superano il 100% perché era possibile selezionare più attività.

Al fine di indagare ulteriormente tale variabilità, tenendo al contempo in considerazione la profondità dell'automazione per ciascuna delle attività svolte, si è proceduto ad una Latent Class Analysis. Nello specifico, le attività di Marketing Automation rappresentano le variabili interne (o "indicatori"); sono state poi inserite come variabili esterne (o "covariate") le dimensioni che, per ciascuna delle attività, ne determinano un utilizzo più o meno profondo, consapevole e autonomo. Tali variabili riguardano: il processo di raccolta e analisi del dato di cliente, i processi a supporto della comunicazione e della gestione del cliente, personalizzate o uniformate, l'integrazione automatizzata tra canali di marketing e i soggetti ai quali è affidata la gestione delle attività di Marketing Automation.

Il primo step dell'analisi LCA richiede l'identificazione del numero di cluster ottimale, attraverso una simulazione di più modelli alternativi con un numero diverso di cluster. Nel presente caso sono state prese in considerazione soluzioni con un numero di cluster variabili tra 2 e 6. Per determinare il numero ottimale di cluster, sono stati utilizzati e confrontati i criteri di adattamento del modello (AIC3, SABIC), dove il minimo valore di ciascun indice identifica la soluzione migliore (Yang e Yang, 2007), La tabella 2 riporta gli esiti del confronto, che ha portato a scegliere la soluzione con 4 cluster; tale soluzione è anche quella con il minor potenziale errore di classificazione (0,0961), Su quest'ultima è stata pertanto poi effettuata la profilazione relativamente sia alle variabili "indicatore" sia alle variabili indipendenti (riportata in Tabella 3), La tabella 3 riporta, per ciascun cluster, le probabilità condizionali associate ad ogni variabile, e permette l'interpretazione delle differenze tra profili attraverso una comparazione dei coefficienti per riga.

Tab. 2: Criteri di adattamento e scelta del modello ottimale

MODELLI CLUSTER	AIC3	SABIC
2-Cluster	820,96	860,99
3-Cluster	738,03	774,34
4-Cluster	723,09	761,26
5-Cluster	750,21	784,65
6-Cluster	783,69	814,41

Fonte: nostra elaborazione.

Tab. 3: Profilo dei cluster relativi all'adozione di tecnologie di Marketing Automation

VARIABILE	CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4
Dimensione del cluster	33,4%	32,2%	27,4%	6,9%
Indicatori				
Invio di mail di benvenuto	0,7898	0,3604	0,9714	0,8641
Messaggi post-vendita	0,6673	0,0405	0,9934	0,0989
Invio di mail per i carrelli abbandonati	0,4603	0,0929	0,9370	0,6777
Attività di remarketing	0,3465	0,0872	0,8991	0,6396
Suggerimenti di prodotti correlati	0,5357	0,0259	0,8469	0,1527
Promozioni personalizzate	0,4888	0,0430	0,7513	0,3959
Lead nurturing / raccolta di contatti	0,2596	0,0145	0,7957	0,3381
Altre attività	0,0163	0,0074	0,0968	0,4347
Covariate				
Strumenti di tracciamento del comportamento del cliente	0,4619	0,2846	0,6567	0,4205
Analisi dei dati tramite software				
Segmentazione di base su criteri demografici	0,6316	0,5160	0,9303	0,7014
Segmentazione avanzata tramite IA	0,4385	0,2850	0,2495	0,2831
Invio di email automatiche	0,1584	0,1314	0,5179	0,2645
Invio di email manuali	0,8960	0,6022	0,9667	0,9989
Integrazione automatizzata tra canali di marketing	0,0872	0,2229	0,0333	0,0009
Gestione affidata al personale interno	0,5251	0,1991	0,6452	0,1267
Gestione affidata ad agenzie o esterni				
Gestione affidata ad entrambi	0,5653	0,4539	0,4251	0,3135
	0,1590	0,1677	0,1561	0,3913
	0,2373	0,2193	0,4188	0,2597

Fonte: nostra elaborazione.

I quattro cluster così emergenti rappresentano pertanto altrettanti profili di e-tailer, ognuno dei quali adotta in modo diverso le tecnologie di Marketing Automation. Riordinando i cluster dal livello più alto al più basso di adozione, il Cluster 3 rappresenta sicuramente le imprese adottanti più esperte (27,4% del campione), Queste imprese svolgono il numero maggiore di attività diverse, impiegando l'automazione all'interno di molteplici processi di comunicazione e gestione della relazione con il cliente, lungo tutta la customer journey. Dimostrano di essere molto avanzati, ricorrendo all'automazione quasi totale per le funzioni più semplici, quali l'invio di email automatizzate, che sono però in grado di personalizzare, grazie a metodi altamente tecnologici di raccolta e analisi del dato. In tal senso, il Cluster 3 è quello che fa un utilizzo maggiore dell'intelligenza artificiale, anche a supporto dell'integrazione tra canali di marketing. Dal punto di vista della gestione di queste attività, le imprese di questo cluster si affidano maggiormente a fornitori e consulenti esterni, ma mantengono al contempo un ottimo livello di controllo interno.

Tanto il Cluster 1 quanto il Cluster 4 manifestano un buon livello di adozione delle tecnologie di automation, ma in direzioni diverse. Il Cluster 1 comprende imprese (33,4% del campione) che potremmo definire "solide": le attività automatizzate sono prevalentemente incentrate intorno all'atto della vendita (es. messaggi post-vendita, suggerimenti di prodotti correlati, promo personalizzate), Nonostante dispongano di una buona conoscenza del cliente attraverso la raccolta di dati di tracciamento, l'analisi del dato e il loro utilizzo rimane limitato (es. viene adottata una segmentazione non dinamica e basata principalmente su criteri demografici), E' inoltre il cluster che fa maggiormente ricorso al personale interno per la gestione delle attività automatizzate, con una struttura più tradizionale. Il Cluster 4, invece, rappresenta utenti che condividono un approccio più sperimentale alla Marketing Automation (6,9% del campione), Queste aziende cercano di utilizzare l'automazione in diversi momenti del customer journey (es. customer care, attività di re-marketing, ecc), e per conseguire obiettivi strategici diversi (dalla conclusione della vendita al supporto alla relazione all'acquisition), Tale approccio si combina, dal punto di vista della gestione, con un forte outsourcing, anche, integrale di queste attività a provider esperti.

Il Cluster 2, infine, costituito dal 32,2% del campione, rappresenta le imprese con un livello minimo di automation. L'utilizzo delle tecnologie di automazione è molto ridotto e circoscritto alle funzioni più semplici da gestire internamente;

come conseguenza, la raccolta del dato è molto limitata e la conoscenza così acquisita non viene sfruttata ai fini di personalizzare la relazione con il singolo cliente.

Limiti della ricerca. *Il presente lavoro non è esente da limitazioni, in primo luogo basandosi sul dichiarato degli intervistati; si è cercato comunque, in fase di campionamento e raccolta del dato, di contenere questo limite, rivolgendoci al principale decisore aziendale o al responsabile di funzione.*

Inoltre, come già anticipato, il lavoro costituisce un primo step di ricerca al quale seguirà uno studio qualitativo che andrà ad ampliare la comprensione del fenomeno, combinando la mappatura dei diversi gradi di adozione della Marketing Automation con un approccio interpretativo delle difficoltà da superare (soprattutto per coloro che hanno raggiunto un livello di adozione limitato o molto circoscritto) e dei potenziali supporti all'avanzamento tecnologico. La Latent Class Analysis, infatti, riesce a descrivere uno status quo, presentando una segmentazione del mercato e-tailing italiano, senza però poter fare luce su cosa abbia causato l'esistenza delle differenze identificate.

Riteniamo infatti di notevole interesse, ad esempio, comprendere quali sono i limiti percepiti dal Cluster 2 verso una maggiore adozione delle tecnologie, se la situazione corrente è dovuta ad una mancanza di consapevolezza rispetto alle opportunità che queste comportano oppure a difficoltà nel sostenere costi di avanzamento tecnologico o di acquisizione delle conoscenze necessarie.

Implicazioni manageriali. *L'adozione delle tecnologie di Marketing Automation costituisce di per sé un tema dalle forti implicazioni manageriali, in quanto capace di influenzare fortemente l'efficienza e la competitività delle imprese adottanti. Ciò diventa ancora più rilevante in un contesto nel quale l'Intelligenza Artificiale sta rapidamente evolvendo, dimostrandosi uno strumento estremamente flessibile da impiegare anche ai fini dell'automazione di varie attività. Report nazionali ed internazionali (si veda Zumstein et al., 2024) mostrano come le aziende, a livello globale, si stiano interessando all'uso dell'IA per attività di ottimizzazione, ma anche per fornire un'assistenza clienti personalizzata, fornire suggerimenti in ottica di up- o cross-selling, e lead identification e generation. Si prospetta pertanto un quadro nel quale gli early adopters consapevoli riusciranno ad acquisire un notevole vantaggio competitivo creando un forte divario dai propri competitors.*

A tale scopo, diventa pertanto necessario riuscire a sensibilizzare verso un rapido sviluppo tecnologico anche quelle imprese che rientrano in un utilizzo ancora limitato o tradizionale delle tecnologie di automazione, creando una consapevolezza anche strategica nei decisori aziendali. Dalla ricerca emerge infatti che, complessivamente, solo la metà delle imprese intervistate (48,6%) ha previsto corsi di formazione interni nell'ambito della Marketing Automation, e solo il 39% prevede di investire ulteriormente in questo ambito nel corso dell'anno successivo. Ciò è a maggior ragione più rilevante nel contesto italiano, caratterizzato da una notevole presenza di piccole e medie imprese, anche nell'ambito e-tailing.

Originalità del paper. *Il paper presenta un quadro del livello di adozione delle tecnologie di Marketing Automation nel contesto di e-tailing italiano proponendo un sistema di segmentazione tramite Latent Class Analysis, alla luce dell'assenza di scale strutturate volte a misurare il fenomeno. Dai risultati emerge la possibilità di identificare differenti cluster incentrati su macro-determinanti quali l'applicazione dei processi di automation alle attività di comunicazione in senso stretto rispetto alla gestione della relazione con il cliente; l'esistenza o l'assenza di processi ibridizzati, e scelte gestionali di presidio interno o di outsourcing.*

Parole chiave: *Marketing automation; e-tailing; Latent Class Analysis; clustering*

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From IP Awareness to Strategic Valorization: bolstering IP capabilities of Italian SMEs through policy interventions

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Abstract

Intellectual Property (IP) management represents a crucial yet often underutilized strategic area for Small and Medium Enterprises (SMEs). Effective management of IP can foster innovation, bolster competitive advantage, and enhance financial sustainability. Nonetheless, SMEs, including Italian firms, frequently fail to fully leverage formal IP protections, thereby hindering their ability to derive value from their innovations. This study, in collaboration with the Italian Patent and Trademark Office (UIBM), investigates the obstacles and facilitators of IP management within Italian SMEs.

deficiencies in awareness, protection, management, and valorization of IP. Despite 58.4% of respondents rating their familiarity with IP as 'good' or 'excellent,' 77% lack a dedicated IP function, and dependence on external expertise remains widespread. Only 38.7% consistently consider obtaining formal and registered IP rights, with cost and administrative burden being primary barriers. Furthermore, strategic integration of IP is limited, with merely 25% of SMEs evaluating the economic value of their IP assets. As a result, formal commercialization through licensing or transactions are scarcely implemented.

Our findings underscore the necessity for targeted policy interventions aimed at bolstering IP capabilities among SMEs. Recommendations include expanding training programs, facilitating advisory services, and promoting collaborations between SMEs, larger firms, and research institutions. By addressing these structural weaknesses, SMEs can transform IP from a passive asset into a strategic driver of growth, competitiveness, and sustained innovation.

Theoretical Background

The role of IP management for SMEs

SMEs face significant liabilities with respect to larger firms. Among these are liabilities of smallness (Garagorri 2016), budgetary constraints and technical reliance on large firms that have more sizeable R&D budgets (Salami 2024), and greater vulnerability to risks such as supplier loss and industrial espionage (Clusel et al. 2013). Therefore, intellectual property (IP) management is an important strategy for small to medium-sized enterprises (SMEs) as it offers numerous benefits that can offset their liabilities and enhance their competitiveness, growth, and financial sustainability in the market, acting both through value creation and value capture mechanisms.

First, IP management plays a vital role in supporting innovation and research and development (R&D) activities within SMEs. By protecting their innovations through IP rights, SMEs can recoup their investments in R&D and fund further innovation (Taglialatela and Barontini 2024). This creates a cycle of continuous improvement and technological advancement (Le and Luong 2022; Chen 2022). Moreover, IP management can facilitate collaboration between SMEs and other entities, such as universities and research institutions, but also suppliers, partners and competitors, in an open innovation perspective (Brem, Nylund, and Hitchen 2017). For instance, licensing agreements may allow enable to access complementary resources and accelerate product development, further enhancing innovative capacity (Le and Luong 2022; Salajová, Kohnová, and Kopliku 2024, Kang 2023).

Effective IP management can also make SMEs more attractive to financial institutions, investors, and acquirers. A strong IP portfolio can serve as collateral for loans or to secure investments. This is particularly important for SMEs that may not have extensive physical assets but possess valuable intangible assets in the form of IP (Lima and Santos 2018; Kang 2023). Additionally, IP management can enhance the overall value of an SME, making it more appealing to potential acquirers or partners. This can lead to increased opportunities for mergers, acquisitions, and strategic alliances, further driving business growth (Ramesh, 2022) (Akimochkina et al., 2022). In this respect, it is also relevant to consider the role of IP in reducing risks for SMEs: by protecting their IP, SMEs can avoid costly legal disputes and

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unauthorized use of their innovations. This protection not only saves financial resources but also safeguards the company's reputation and market position (Akimochkina, Rudakova, and Abramov 2022; Chen 2022).

From a more strategic perspective, aligning IP management with the overall business strategy is crucial for SMEs to maximize the value of their IP. By integrating IP management into their strategic planning, SMEs can identify and prioritize their most valuable IP assets, ensuring they are used effectively to achieve business objectives. This strategic alignment can lead to the creation and capture of long-term value for the company and its stakeholders (Lima and Santos 2018; Nikolova-Minkova 2023). Indeed, by leveraging IP rights such as patents, trademarks, and copyrights, SMEs can differentiate their products and services from those of their competitors, preventing competitors from replicating their unique offerings. This differentiation can lead to increased market share and customer loyalty, which are essential for sustained growth (Holgersson 2013; Akimochkina, Rudakova, and Abramov 2022; Chen 2022; Ramesh 2022; Nikolova-Minkova 2023). Furthermore, IP management can help SMEs adapt to emerging trends and technologies, ensuring that they remain at the forefront of innovation and technological advancement. This can lead to increased market share and improved profitability in the long run (Akimochkina, Rudakova, and Abramov 2022; Kang 2023). The increase in market share may also depend on the fact that IP management can facilitate market expansion: by licensing their IP, SMEs can enter new markets and reach a broader customer base. Additionally, IP can help SMEs overcome barriers to entry in foreign markets. A strong IP portfolio can serve as a valuable asset when negotiating partnerships or seeking investments, making it easier for SMEs to expand their operations internationally (Kang 2023).

Effectiveness of IP Management in SMEs

SMEs must undertake various activities to ensure successful IP management, which are often categorized into several stages in the literature.
of IP and the most effective methods for managing it (Holgersson 2013). This may include engaging in partnerships and networks, which can provide SMEs with additional resources and knowledge for managing their IP (Dereń and Skonieczny 2023).

The company's second step in the IP management process should be ***identifying the various forms of intellectual property*** *it possesses or could develop (Holgersson 2013; Nikolova-Minkova 2023). Once identified, the next step is to evaluate the value and potential of these IP assets. This assessment helps SMEs understand how their intellectual property can contribute to their overall business strategy and economic benefits. It involves analyzing the market potential and competitive advantage that the IP can provide and eventually tailoring business models around valuable IP (Dereń and Skonieczny 2023; Nikolova-Minkova 2023).*

After evaluating their IP, SMEs need to formulate a strategy for its ***protection****. This involves selecting suitable legal mechanisms, such as patents or trademarks, to secure their innovations, and deciding whether to implement formal or informal protection measures. The strategy should be in alignment with the overall business objectives and weigh the costs and benefits of various protection regimes (Dereń and Skonieczny 2023; Nikolova-Minkova 2023). Subsequently, the protection strategy must be executed by undertaking all necessary legal steps to safeguard the IP.*

Once protections are established, SMEs must consistently monitor the market for infringements and enforce their rights. This involves tracking competitors and ensuring their IP is not used without permission (Nikolova-Minkova 2023). Additionally, they should actively ***manage their portfolio****, deciding on the renewal of rights and their suitability for various commercialization strategies (OECD 2011).*

Once an IP management strategy is established and the necessary IP rights have been secured, SMEs should concentrate on effectively ***valorizing their IP rights****. This entails maximizing the value extraction from their IP for growth and competitive advantage (OECD 2011; Dereń and Skonieczny 2023). To achieve this, small companies can leverage strategic networking and open innovation principles to access complementary resources by leveraging their IP as a quality signal (Belingheri and Leone 2017; Salajová, Kohnová, and Kopliku 2024). These activities can enhance market reach, accelerate product development, and ultimately support SMEs in better leveraging their physical, organizational, and human capital resources to enhance value capture in the market (Salajová, Kohnová, and Kopliku 2024; Wang et al. 2025). Licensing is another channel through which SMEs can leverage their IP, generating additional returns while protecting core business interests (Goldheim et al. 2005).*

Finally, it is crucial for SMEs to periodically review their IP management strategy to remain responsive to market, technological, and business environment changes. This method ensures that the intellectual property remains pertinent and continues to offer a competitive advantage (Dereń and Skonieczny 2023; Nikolova-Minkova 2023).

The adoption of IP Management in SMEs

Notwithstanding these benefits, literature finds that SMEs systematically under-utilize IP. Evidence shows that only 9% of SMEs in Europe owns a registered industrial property right, such as a patent, a trademark or a registered design (EC Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs 2021). As a result, SMEs often face significant challenges related to counterfeiting and the unauthorized use of their rights. According to the OECD, the United States, Switzerland and Italy are the top three countries whose SMEs have been most affected by counterfeiting (OECD and European Union Intellectual Property Office 2023). In addition, SMEs have been observed to restrict their

patent validity to their home country, thereby limiting the protection that patents afford and the value that can be extracted from them (Friesike et al. 2009).

SMEs struggle to fully capitalize on IP both due to a lack of knowledge of the benefits but also the high costs of obtaining and maintaining the IP rights (Holgersson 2013; Lima and Santos 2018). These aspects discourage SMEs from obtaining IP rights in the first place. SMEs also often struggle to navigate the complexities of the IP system, which can hinder their ability to protect and leverage their innovations (Holgersson 2013; Eppinger and Vladova 2013; Nikolova-Minkova 2023), limiting the value capture they can obtain from the IP. Indeed, SMEs prefer to use informal rights (such as trade secrets) rather than formal ones (such as patents, trademarks and design), primarily due to their familiarity and lower costs. This preference is particularly evident in smaller firms that may not have the resources to pursue formal IP protection (Kitching and Blackburn 1998).

Aim of the paper. *Although literature has clearly identified the different actions that SMEs should take to maximize the benefits obtained through sound IP management strategies and practices, there is a lack of empirical evidence on how SMEs are implementing the above-mentioned processes, and the key barriers that they experience in the different phases of the IP management process.*

This study, conducted in cooperation with the Italian Patent and Trademark Office (UIBM), aims to assess the level of knowledge and management practices regarding Intellectual Property (IP) among Italian SMEs in the above-mentioned dimensions. According to the European Investment Bank (2021), in 2021 Italy had around 4.3 million SMEs, making up 99.9% of the countries' registered firms, 95% of which were micro-enterprises employing fewer than 10 people. Together these contributed to 70% of Italy's gross value added, 80% of overall employment, and 53% of the country's exports.

The study focuses not only on the practices, but also on the underlying reasons, namely barriers, beliefs, or motivations for SMEs to pursue or not pursue IP management. Through this study, we aim to better inform policymakers on the potential interventions that can be successful in raising the maturity of SME's IP management practices, towards an effective use of IP for their competitiveness.

Methodology. *The research is based on a structured survey administered in two waves, the first between 2018 and 2020, and the second between 2021 and 2023, targeting a broad and diverse sample of non-overlapping SMEs. The first dataset consisted of 1,022 SMEs, while the second dataset consists of 3,082 SMEs. The respondents were identified and contacted through a structured selection process. The survey was administered by personnel from universities, public research institutions, and scientific hospitals as part of a UIBM-funded initiative to enhance university technology transfer offices.*

The data collection relied on both primary and secondary sources: Primary data were gathered through structured interviews using a standardized questionnaire, ensuring consistency and minimizing bias. The questionnaire was formatted as a non-editable Excel file, limiting the interviewer's influence on the questions. Secondary data was extracted from Orbis, providing additional insights into firms' financial performance, governance structures, and innovation-related investments.

The questionnaire was structured around four key dimensions of IP management, each one examined through a series of between 4 and 13 questions:

***Awareness**: Refers to the knowledge of relevant aspects of the IP discipline and the awareness of the competitive and strategic value of IP.*

***Protection**: Concerns the ways in which the company safeguards its IP (registered IP rights and/or informal IP such as trade secrets), as well as the adequacy of these tools in relation to the company's specific activities and the competitive environment in which it operates.*

***Management**: Assesses the resources and practices employed by the company in managing its IP portfolio, considering both an internal perspective (identifying relevant IP to protect and administrative management processes) and an external perspective (i.e., monitoring and enforcement).*

***Valorization**: Analyzes the overall management of the company's IP portfolio, focusing on its integration with the business strategy and the company's inclination to capitalize on commercial opportunities related to IP—not just from a defensive standpoint but also through an open and cooperative management approach.*

*Additionally, the **innovation propensity** of each SME was assessed through questions on R&D activities, in-house technological assets, and external collaborations.*

As longitudinal analysis was not possible due to the lack of overlap between the SMEs present in the two survey waves, our results focus on the second, more numerous datasets, offering also some comparisons with the first data collected in 2018-2020.

The 2021-2023 sample exhibited a regional imbalance, with higher participation from the regions of Lombardy, Emilia-Romagna, Campania, and Puglia. Overall, firms from southern Italy were underrepresented. Regarding firm size, the dataset comprised 44.6% micro-enterprises (<10 employees), 33.3% small enterprises (10-49 employees), 17.7% medium-sized firms (50-249 employees), and 4.4% larger firms (>250 employees).

In terms of industry composition, most respondents operated in manufacturing and services, with fewer firms engaged in software development. Regarding their competitive landscape. 41.3% of SMEs faced more than 10 direct competitors, while 17.4% reported 4 to 10 competitors, indicating a predominantly high-competition environment.

The survey also assessed innovation-related activities: while 69.5% of firms engaged in R&D, only 52.4% had dedicated internal R&D activities. Additionally, 78.6% of SMEs identified internal know-how as their main competitive advantage, surpassing R&D investments (27.5%) and proprietary technological assets (34.4%).

The study's next phase will incorporate inferential statistical approaches to identify links between business characteristics and IP practices, even though the major analyses conducted thus far have been descriptive—suitable for mapping trends in a large and diverse dataset. In particular, we intend to:

- *To determine whether firm-level factors (such as size, R&D intensity, and ownership structure) are predictive of better success across the four IP characteristics*
- *To investigate geographic differences in IP behavior, especially when comparing northern and southern regions, include regional fixed effects.*
- *To investigate whether businesses in high-tech industries exhibit more sophisticated IP valorization techniques, introduce sectoral dummy variables (manufacturing, services, and software).*
- *To see whether the influence of specific company attributes varies depending on the situation, look at interaction effects (size × sector, for example).*

These analyses aim to move beyond description to deliver a systematic, hypothesis-driven exploration of how structural and strategic factors shape IP management among Italian SMEs. Despite acknowledged limitations—such as the inability to conduct panel-based longitudinal analysis and the underrepresentation of some geographic areas—the richness of the dataset supports a wide range of robust analytical strategies.

Results. *The analysis provides important insights into the intellectual property (IP) management practices of Italian SMEs. IT is divided into the four dimensions of awareness, protection, management and valorization.*

Awareness

Despite 58.4% of respondents rating their familiarity with IP as 'excellent' or 'good', 77% of companies surveyed do not have dedicated IP staff or organizational units. This percentage has gotten worse compared to the prior survey, suggesting that internal IP management capabilities have declined. Businesses frequently look for outside expertise for IP knowledge; 81.9% of respondents report actively seeking out information on intellectual property issues, with 32.3% contacting law firms and 44,5% contacting specialized consultants as the top two information sources. Less frequently, are institutional sources like the Italian Patent and Trademark Office contacted by 23.8% of firms and local chambers of commerce by 22.7%. Internal R&D and legal teams are rarely considered to be the main sources of information about intellectual property. Only 12.2% of businesses mentioned their R&D managers and 12.1% mentioned their internal legal departments as their go-to source. Reliance on external expertise (e.g., law firms and consultants) remains high, whereas internal R&D and legal teams are seldom primary sources of IP knowledge. This points to an ongoing outsourcing of strategic IP knowledge, which may limit firms' ability to internalize and sustain innovation capabilities.

Therefore, although businesses acknowledge the value of intellectual property, they frequently lack systematic methods for handling it. Many businesses appear to lack a comprehensive IP management strategy, as evidenced by their heavy reliance on outside expertise and lack of dedicated IP staff. This disparity indicates that, to increase businesses' capacity to successfully safeguard and capitalize on their IP, more funding should be allocated to internal IP training and strategy development.

These findings suggest that awareness is often superficial—acknowledging the importance of IP without embedding it into daily operations. Future analysis will investigate whether firm size, sector, or past engagement with innovation policies predicts deeper organizational investment in IP knowledge.

Protection

The data collected shows that while companies report seeking out IP knowledge and performing internal innovation, their approach to legal protection remains inconsistent. Only 38.7% of companies reported that they regularly consider legal protection for their industrial property, a percentage that has remained stable compared to the previous survey period. The top IP rights obtained are trademarks that are reported by 48% of SMES, while 43% have patents or utility models and 43% report trade secrets.

The survey also examines the perceived advantages and disadvantages of legal protection. Among the advantages, 50.8% of respondents mentioned the company's reputation and credibility, 35.3% mentioned better business prospects, 29.1% mentioned more chances to collaborate with potential clients and business partners, 7.4% improved sales and profits, and 4.3% access to financing. On the other hand, around 26% of SMEs point out major obstacles to implementing legal protection measures. Cost (38.3%) and the administrative burden of protection measures (22.7%) are the most frequently mentioned deterrents, and both have grown considerably since the previous survey period. Moreover, 2.3% of companies report that IP registration didn't prevent infringement, 1.6% believe obtaining IP rights would have delayed their market entry, and 1.3% experienced high litigation costs with adverse outcomes.

Overall, while companies recognize the importance of protecting their intellectual property, many are still struggling to integrate effective protection mechanisms into their business strategies. The findings underscore the need for greater investment in resources and support to improve IP management and ensure that intellectual assets are protected according to a precise management strategy. More granular analysis will test whether perceived barriers are systematically higher among certain firm profiles (e.g., micro-enterprises, firms without prior policy engagement), allowing for better-targeted interventions.

Management

According to the findings, only 22.5% of businesses have internal resources specifically allocated to IP management, while the majority only use outside experts. A basic level of control that prioritizes registration and bureaucratic compliance over proactive protection and enforcement is the outcome of this severe lack of internal competence, which makes IP management especially complex and difficult.

In addition, preventive measure remain rudimentary: only 18% of businesses periodically invest resources in examining IP infringements, and 5.6% said they don't have any internal resources set aside for this purpose. Furthermore, there is still a lack of effective preventive methods against IP infringement. Although only 40.9% of businesses completely lack preventive measures, which is a slight improvement over 2021 (43%), many companies who actively report preventing infringement still rely on crude techniques such as business partner reports (25.7%), or customer complaints (16.5%). As a result, the percentage of companies that report having detected an IP infringement in the last 5 years is only 20%, and this very low level - not in line with previously mentioned estimates from the OECD - could in fact hide an overall ignorance of companies of imitations and infringements that are occurring.

While companies recognize the importance of IP management, their ability to implement effective strategies remains limited by resource constraints and a lack of internal expertise. Businesses that lack organized enforcement procedures are more vulnerable to infringement and less competitive on the market. To address these challenges, companies need to develop more structured IP management practices, invest in specialized personnel and implement comprehensive monitoring systems to protect their intellectual assets. The absence of structured enforcement strategies poses a systemic risk, especially as digital markets and global competition increase exposure to imitation. Planned regression analyses will test whether governance models, innovation intensity, or regional factors predict higher management capabilities.

Valorization

Although the value of formally protecting intellectual property through trademarks and patents is becoming more widely recognized, this recognition often doesn't translate into successful commercial exploitation. First, only 24% of respondents report having specific strategies to valorize their IP. Another 25% reports implementing generic strategies that also include an IP valorization component. Evaluation often happens when transactions are imminent (sale, licensing or funding needs) or for accounting purposes. According to the SMEs, when effectively designed and implemented, IP valorization strategies enhance commercial exploitation of innovation (12.9%), foster new business collaborations (10.4%), prevent imitation (10.1%), and generate direct revenue from licensing (5.5%), with other factors such as influencing technology trajectories, not infringing on others' IP, freedom-to-operate and preventing legal controversy. playing a marginal role.

A full 51% of the SMEs, instead, report having no strategy for IP valorization. In these cases, the belief that the expenses of IP registration and management outweigh the anticipated advantages is one of the biggest challenges. SMEs are deterred from investing in structured IP strategy as a result.

The lack of propensity in actively managing their IP portfolio is reflected also in the limited number of transactions reported involving patents, licenses, and other kinds of technology transfer, where 13% of firms report outgoing IP transactions mainly for financial gain and 24% report incoming IP transactions to acquire knowledge and expand their business (only a small minority for litigation purposes). These low percentages are a result of many SMEs' continued inability to incorporate IP management into their larger business plans.

Finally, the study highlights important weaknesses in strategic IP management. Few businesses routinely evaluate their intellectual property assets in connection to their posture in the market. Only a minority of companies, 14.7% regularly assess the coherence between their IP assets and the markets in which they operate. In addition, 35.8% of companies do not perform any valuation of their IP, while 36.8% perform only partial valuations. As a result, only 25.2% of companies surveyed are fully aware of the economic value of their IP, a figure that has improved only slightly compared to the previous survey.

The results point to the necessity of focused training programs to assist SMEs in incorporating IP into their entire business plan to enhance the economic exploitation of IP. The findings reinforce the need to frame IP as a ***dynamic business asset****, not a static legal instrument. Sectoral comparisons will be explored in the next phase to determine whether knowledge-intensive industries (e.g. software, biotech) exhibit systematically stronger valorization behavior.*

Complementary Analysis

Despite only covering around half of the sample, the secondary data analysis offers a more thorough insight of the businesses polled. According to the data, microbusinesses made up nearly half of the observed sample (44.6%), followed by small businesses (33.3%), medium-sized businesses (17.7%), and larger businesses (4.4%).

In line with previous literature, the significant relationship between business size and innovation capacity is one of the key conclusions. Bigger companies typically make greater R&D investments, amass more intangible assets, and incorporate industrial property into their business plans in a methodical manner. Their capacity to take advantage of economies of scale, enhance intellectual property protection, and lessen the risks connected with intangible investments is partly responsible for this.

The study also examines corporate governance frameworks and how they affect intellectual property management and innovation. Because more formal governance models make it easier to make decisions about risk management and

IP investments, firms with clear governance frameworks are more likely to engage in systematic evaluation of their IP portfolios to ensure alignment with market needs and business strategies.

Another important aspect explored in this section is the relationship between firm size and the awareness, protection, management and exploitation of IP rights. Findings suggest that larger firms not only register more IPRs, but also actively manage and exploit them for competitive advantage. In contrast, smaller firms often lack the financial resources and internal expertise to fully integrate IP rights into their business strategies. While some SMEs recognize the importance of IP, a large proportion still treat it as a passive asset rather than an active strategic tool.

The findings highlight the two problems that many SMEs face: a mismatch between the firms' absorptive capacities and the available assistance measures, as well as a lack of internal IP skills. Future policy design must take firm-side readiness into consideration, providing progressive, modular support mechanisms that scale with organizational maturity, since companies frequently lack the bandwidth to fully engage with complex IP systems.

Furthermore, especially for micro and small businesses, the gap between awareness and action necessitates training and integrated consulting services. Enhancing internal skills will facilitate more active valuation, cooperation, and strategic use of intellectual property in addition to increasing the use of formal protection.

Conclusions. *The results highlight both progress and continuing challenges. Compared to previous surveys, there has been a marked improvement in the general awareness of IP issues. Companies have increasingly turned to external resources and consultancy services to fill internal knowledge gaps. However, structural deficiencies remain, especially the lack of dedicated staff and integrated strategies for IP valorization. These weaknesses limit the effectiveness of protection measures and the economic benefits that companies can derive from their intellectual assets.*

A key observation is that while Italian enterprises show a growing inclination towards formal protection mechanisms, this does not always translate into effective commercial exploitation. Only a minority of SMEs actively develop strategies to manage their IP, as evidenced by the limited number of patent and licensing transactions, which remain marginal compared to their potential. Although incentives for protection and exploitation exist at the national and European level, they have limited effects due to a lack of awareness and know-how in SMEs.

Another critical issue is the perception of the costs associated with registering and managing formal IP. Many SMEs consider these costs to be too high in relation to the expected benefits, discouraging them from adopting comprehensive IP protection and valorization strategies. This challenge is particularly pronounced for micro and small enterprises, which operate with limited resources and must carefully allocate their budgets.

Research limitations. *A limitation of this study concerns the second analysis, the integration of interview data and secondary data on the sample. Specifically, size and financial information was obtained from Orbis by scraping company names. However, companies are more likely to be registered in Orbis if they are large. Thus, a larger percentage of small and medium-sized companies that made up the Orbis sample were excluded from the financial analysis. This will be addressed in further survey editions.*

Managerial implications. *This research provides a comprehensive, data-driven understanding of how Italian SMEs approach IP. The broad sample of 3,082 firms ensures robust generalizability, while the integration of primary and secondary data enhances analytical depth. The findings highlight key gaps in IP awareness and management, particularly among smaller firms, informing future policy recommendations for strengthening IP practices within SMEs.*

To address these challenges, the study recommends several key actions. First, expanding targeted training programs focused on IP management and valorization could improve SMEs' ability to integrate IP into their business models. Second, the introduction of personalized advisory services, such as the EUIPO's IP Scan model, would provide tailored guidance to optimize IP strategies. Third, fostering strategic cooperation between SMEs, large enterprises and research institutions could promote knowledge transfer and innovation through IP. Finally, the establishment of a permanent observatory on IP would allow continuous monitoring and evaluation of policies to ensure that they remain in line with evolving market needs.

Strengthening the IP culture in the Italian SME ecosystem requires a coordinated effort between institutions, companies and specialized consultants. The goal is to change the perception of IP from a mere defensive tool to a strategic asset that can drive competitiveness, innovation and long-term economic growth.

Originality of the paper. *This study offers a unique empirical analysis of IP management in Italian SMEs, integrating survey data from 3,082 firms with secondary financial insights. Unlike prior research, it identifies key barriers to IP valorization and provides actionable recommendations, bridging the gap between theoretical frameworks and real-world SME challenges in IP strategy.*

Key words: *Intellectual Property, SMEs, IP Management, Innovation, Competitiveness, IP Valorization.*

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The Dynamic Role of Digital Orientation in Shaping SME Performance

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Abstract

Nowadays, small and medium-sized enterprises (SMEs) are increasingly adopting digital orientation as a strategic approach to enhance competitiveness. While digital orientation is recognized for its potential to drive innovation and financial performance, empirical evidence, particularly for SMEs, remains fragmented and inconclusive yielding mixed results regarding the relationship between digital orientation and organizational performance. Using a panel of 250 SMEs for 10 years and a Generalized Method of Moments (GMM), this study aims to fill this gap by examining the effects of digital orientation on both financial and innovation performance in SMEs. Results reveal that there is an inverted U-shape relationship between digital orientation and financial performance, while a U-shape relationship is found with digital orientation and innovation performance. This study has several implications for both academics and SME managers.

Framing of the research. *Digital orientation, defined as a firm's proactive alignment and integration of digital technologies into its operations (Kindermann et al., 2021), has emerged in the current digital age as a pivotal strategic positioning that shapes how firms operate, utilize resources and develop capabilities, create value, and sustain competitive advantage (Ardito et al., 2021; Kindermann et al., 2021, 2024; Mishra et al., 2024; Ranjan, 2024). Digital orientation encompasses four interrelated dimensions - digital technology scope, digital capabilities, digital architecture configuration, and digital ecosystem coordination - that collectively enhance an organization's potential to innovate and remain resilient amid technological shifts (Kindermann et al., 2021, 2024; Quinton et al., 2018). Digital technology scope refers to the breadth and depth of technological tools adopted by a firm, including cloud computing, artificial intelligence, and data analytics, which enable SMEs to enhance their digital processes and competitiveness. Digital capabilities represent a firm's ability to leverage digital tools effectively, integrating new technologies into existing workflows to optimize productivity, efficiency, and innovation. Digital architecture configuration pertains to the structuring of IT infrastructure and systems within a firm to support digital processes, ensuring scalability, security, and interoperability. Digital ecosystem coordination involves the firm's ability to engage in collaborative digital networks, leveraging partnerships, supply chains, and digital platforms to enhance value creation and business expansion.*

For SMEs, adopting digital orientation is both critical and challenging for their survival and success (Ardito et al., 2021; Barragan et al., 2024; Ranjan, 2024). Unlike large enterprises, which often have dedicated resources for digital transformation, SMEs must navigate digitalization with limited financial and human capital (Park et al., 2020). This makes the strategic alignment of digital orientation crucial, as firms must carefully balance the benefits of digitalization with its associated costs and complexities. Through the lens of the resource-based view (Barney, 1991) and dynamic capabilities (Teece et al., 1997), digital orientation that is considered a valuable strategic asset enables SMEs to leverage digital assets and respond swiftly to changes (Bendig et al., 2023), reinforcing their competitive positioning (Kindermann et al., 2024). Specifically, digital orientation allows SMEs to strategically use digital resources across the organization to optimize internal processes (Li et al., 2023), enhance capabilities, and strengthen their competitive advantage (Barragan et al., 2024; Kindermann et al., 2021). This strategic orientation enables firms to foster new products and services more effectively, enhancing innovation (Ardito et al., 2021), and improving market responsiveness (Bendig et al., 2023; Maurer et al., 2023; Mishra et al., 2024). By leveraging digital orientation, firms achieve digital capabilities and competencies that lead to improved outcomes, offering opportunities to drive both innovation performance and financial performance (Kindermann et al., 2024; Quinton et al., 2018; Ranjan, 2024). Additionally, the ability to successfully implement and integrate these four dimensions is critical for SMEs aiming to remain competitive (Ranjan, 2024). The interplay among these elements determines how well an SME can shift from traditional business models to more digitally driven operations (Matarazzo et al., 2021), ensuring long-term sustainability and growth (Barragan et al., 2024).

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Despite these potential benefits, the scholar understanding of digital orientation's impact in firms remains fragmented and underexplored, with existing research yielding inconclusive results for both innovation performance and financial performance, especially in SMEs. For example, Ranjan (2024) highlighted a positive link between digital orientation and innovation performance in Indian SMEs, while Nasiri et al. (2022) found no conclusive evidence on whether and how digital orientation enhances financial performance in Finnish firms. This inconsistency underscores a critical research gap regarding the strategic pathways through which digital orientation translates into financial and innovation success for SMEs (Ardito et al., 2021; Barragan et al., 2024; Ranjan, 2024).

Furthermore, while digital orientation offers SMEs the promise of increased adaptability and competitive advantage, the intrinsic characteristics of these firms may limit the sustained benefits of a high level of digital orientation (Barragan et al., 2024). As digital orientation intensifies, SMEs may face challenges associated with managing complex digital systems and maintaining flexibility (Kindermann et al., 2024). High levels of digital orientation often require specialized knowledge and capabilities (Li & Shao, 2023) that SMEs may lack, increasing dependency on external expertise and inflating costs. Additionally, coordinating the interrelated dimensions of digital orientation requires careful management; failure to do so may generate friction with ecosystem partners and customers, potentially leading to operational inefficiencies and diminished performance (Kindermann et al., 2021). Moreover, regarding innovation performance, overemphasis on digital orientation might lead to organizational inertia, where firms become overly reliant on existing digital systems and less capable of adopting new innovative practices.

These insights suggest that digital orientation may initially enhance performance up a certain point, where further increases in digital orientation may yield diminishing or negative performance for SMEs. For example, excessive investments in digital architecture and ecosystem coordination may tie up resources that could otherwise be directed toward core business functions, potentially leading to rigidity, reduced adaptability, and resource strain (Kindermann et al., 2024). Specifically, managing extensive digital ecosystems can create strategic misalignment integrating challenging new digital processes within the existing business models, potentially eroding both financial performance and innovation performance by diverting attention and resources away from core competencies and creating operational inefficiencies. Therefore, an inverted U-shaped relationship may better capture the effects of digital orientation on financial performance and innovation performance in SMEs.

Addressing this research gap, our study investigates the relationship between digital orientation, innovation performance and financial performance over time and accordingly, we posit:

***H1**: Digital orientation has a curvilinearly effect (inverted U-shape) on SMEs' innovation performance*

***H2**: Digital orientation has a curvilinearly effect (inverted U-shape) on SMEs' financial performance.*

By empirically testing these hypotheses, our study contributes to the literature by providing nuanced insights into the effects of digital orientation on SMEs' organizational performance. This research not only fills a relevant gap in the existing literature but also offers valuable implications for SME managers.

Purpose of the paper. *The objective of this paper is to explore the relationship between digital orientation and SME performance, considering both financial performance and innovation performance. Despite extensive literature on digitalization, the role of digital orientation in SMEs remains unclear, with contradictory findings. This study aims to address this gap by analyzing an original dataset of 250 Italian SMEs over a ten-year period (2013–2022) using a Generalized Method of Moments (GMM) model. A key motivation for this research lies in the growing necessity for SMEs to integrate digital technologies within their operations to remain competitive in an increasingly digital economy. While larger enterprises have the resources and strategic flexibility to adopt digital tools at scale, SMEs often struggle due to financial constraints, lack of technical expertise, and difficulties in managing digital transformation processes. Understanding how DO influences SME performance is crucial in helping managers make informed decisions about digital investments, ensuring that these investments are optimized for long-term success rather than leading to diminishing returns. Moreover, the study responds to the need for empirical validation of DO's impact on SME competitiveness. Many prior studies have focused on large firms, overlooking how SMEs navigate digital transformation differently. By focusing on a diverse sample of SMEs, this research provides a more granular understanding of DO's role in shaping financial and innovation outcomes, emphasizing the unique challenges and opportunities present in the SME context. Additionally, it offers practical insights for policymakers aiming to support SMEs in their digital adoption strategies, helping to bridge the gap between theoretical research and real-world applications. The empirical analysis will provide insights into the nonlinear relationship of digital orientation in the context of SMEs by aiming to advance existing research in three ways (i) by increasing the knowledge of digital orientation in SMEs, (ii) by constructing an original data panel by collecting variables with an innovative approach, Wayback machine tool and mission statement analysis. By contributing to both theory and practice, this paper aims to serve as a reference point for future studies exploring the evolving role of DO in SME success, ultimately guiding firms toward more effective digital transformation strategies that enhance performance without incurring unintended negative consequences.*

Methodology. *We constructed an ad hoc balanced panel dataset of 250 Italian SMEs over a ten-year period (2013–2022), resulting in 2.500 observations using probability-proportional-to-size-sampling to have a representative sample across Italy to ensure highly heterogeneity. The sample reflects the European and Italian context characterized by SMEs all over the country with a clear distinction across sector and enhance the external validity of our results to the EU countries. To do this we used different sources: AIDA Database, Crunchbase, SMEs' website with Wayback Machine tool and Italian Chambre of Commerce register for SMEs. These sources were used to extract both financial and innovation-related variables, ensuring a comprehensive assessment of SMEs' digital orientation and performance over time. The*

combination of structured financial data and unstructured textual data from company websites provides a robust basis for analyzing the impact of DO on SME performance. To ensure data accuracy, we employed a multi-step validation process, cross-referencing multiple sources to reduce the risk of missing or misclassified data. Additionally, we performed data cleaning and preprocessing to mitigate potential inconsistencies in reporting standards across different sources. The use of the Wayback Machine enabled us to track historical changes in SMEs' digital presence, allowing for a more dynamic measurement of DO variables. To ensure the academic rigour, SMEs are defined according to Europe 2002[4] *and European Commission*[5] *definitions.*

Digital orientation, the independent variable, was measured using the principal component analysis (PCA) of the four dimensions - digital technology scope, digital capabilities, digital architecture configuration, and digital ecosystem coordination. The analysis used content form the Italian Cambre of commerce register for SMEs, where descriptions of company activities were extracted and processed using MaxQDA software to identify the specific words[6] *related to these dimensions. Each dimension was operationalized using keyword frequency analysis applied to textual data. To ensure robustness, the back translation method was applied, translating the words from English to Italian and vice-versa to add consistency. Innovation performance, the first dependent variable, was measured by the number of patents registered annually. Patent data were collected via an innovative method utilizing the Internet Archive's Wayback Machine and cross-validated with Crunchbase Pro. This measure captures both the quantity and quality of innovation output over time. Financial performance was assessed using Return on Sales (ROS), a widely accepted metric that reflects a firm's operational efficiency and profitability. ROS was calculated as the ratio of net income to total sales revenue, allowing for cross-sectional comparisons among SMEs in different industries. Additionally, we included several control variables – firm age measured by the natural logarithm of the number of years since the firm's founding, firm size measured by the total number of employees, total assets as a proxy for firm resources, included as a control for financial capacity, manufacturing industry measured by a dummy variable indicating whether the firm operates in the manufacturing sector (1 for the manufacturing industry, 0 otherwise), innovation intensity by a dummy variable based on industry-wide innovation benchmarks followed Peneder (2010) approach.*

We employed the two-step Generalized Method of Moments (GMM) estimator to test our hypotheses, due to its ability to account for dynamic panel data structures, mitigating potential endogeneity issues by incorporating lagged dependent variables as instruments. This approach also addresses heteroskedasticity and autocorrelation, enhancing the reliability of coefficient estimates. Model specification tests, including the Hansen test for instrument validity and the Arellano-Bond (2) test for autocorrelation, confirmed the suitability of our empirical approach. To further validate our findings, we conducted robustness checks using alternative model specifications, including fixed-effects regression and random-effects models. These additional tests confirmed the stability of our results across different estimation techniques.

Results. *The results reveal no support for H1 showing a U-shaped relationship between digital orientation and innovation performance in SMEs. Higher levels of digital orientation initially correlate with decreased innovation performance, but after a threshold, digital orientation investments start to positively affect innovation performance. This suggests that early-stage digital investments may disrupt existing innovation structures, but over time, as SMEs refine their digital strategies, the benefits begin to start. The transition from initial inefficiencies to improved IP indicates that digital transformation requires an adaptation phase before delivering positive innovation outcomes. Conversely, we found an inverted U-shaped relationship between digital orientation and innovation performance, supporting H2. Initially, increasing digital orientation enhances financial performance, up a certain point after which the positive role of digital orientation for financial performance start to diminish. This finding highlights the need for SMEs to adopt a balanced digital strategy, ensuring that investments align with operational capacity and financial sustainability. These results underscore the complexity of DO's impact on SME performance, reinforcing the argument that digital adoption should be carefully managed to avoid inefficiencies. While moderate levels of DO yield substantial benefits, overcommitment to digital transformation without strategic alignment can erode performance, making it crucial for firms to evaluate the scalability and feasibility of their digital initiatives.*

Research limitations. *This study has several limitations. First, the sample is limited to Italian SMEs, which may restrict the generalizability of results to other geographical and economic contexts. While Italy offers a compelling setting due to the strong presence of SMEs in its economy, extending the analysis to SMEs in different countries would provide a more comprehensive understanding of how DO influences firm performance in varying institutional and market conditions. Future research could expand the scope to include SMEs from different European nations or global markets to assess whether similar curvilinear patterns hold in different economic environments. Second, the measurement of digital orientation relies on textual analysis of business information, which may not fully capture the depth of digital integration within firms. Third, despite controlling endogeneity using GMM, potential unobserved factors influencing digital orientation-performance relationships may still exist. Future research could examine how firm-specific characteristics, such as ownership structure, internationalization strategies, and sector-specific technological intensity,*

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4 The category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 people, and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million, "*Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises*" *https://ec.europa.eu/smes/*

5 https://ec.europa.eu/reg.innov.score.2023

6 See Kindermann (2021) for the list of the word and see Barragan (2024) for the step involved in this research approach

moderate the DO-performance link. Investigating these factors could enhance the digital transformation strategies tailored to different SME profiles.

Managerial implications. *This study contributes to the literature on strategic management and digital transformation by elucidating the non-linear effects of digital orientation on SMEs' performance. The U-shaped relationship with innovation performance supports the notion that initial digital orientation efforts might disrupt existing innovation processes, but sustained investment eventually leads to enhanced innovation capabilities. The inverted U-shaped relationship with financial performance suggests that while digital orientation can be a valuable strategic asset, overinvestment without adequate resource alignment may lead to inefficiencies. These findings underscore the importance of a balanced and strategic approach to digital orientation implementation in SMEs. Managers should recognize that while adopting digital technologies can drive performance gains, there is a critical inflection point beyond which additional investments may not yield proportional benefits and could strain limited resources. Moreover, given that digital orientation consists of multiple interrelated dimensions, managers must adopt a balanced approach when implementing digital strategies. Overinvesting in one dimension (e.g., digital architecture configuration) while neglecting others (e.g., digital ecosystem coordination) can lead to inefficiencies and suboptimal performance. Managers should focus on integrating all four dimensions holistically to maximize the synergies between technological infrastructure, digital skills, and external collaborations. To optimize both innovation and financial outcomes, SMEs should seek the alignment of digital orientation initiatives with organizational capabilities, to ensure an adequate resource allocation, and continuously monitor the impact of digital orientation on their performance. Additionally, SMEs should prioritize scalable digital solutions that offer flexibility without overburdening financial or human resources and they should leverage external partnerships and industry networks to mitigate the challenges associated with digital transformation. Collaboration with technology providers, industry consortia, and government initiatives can help SMEs access financial support, expertise, and shared digital infrastructure, reducing the costs and risks of digital adoption. Finally, policymakers play a crucial role in facilitating SME digitalization. Governments and industry associations should design targeted support programs that provide SMEs with access to funding, digital training, and technology consultancy services. Additionally, regulatory frameworks should be developed to ensure that SMEs can integrate digital tools without facing excessive compliance burdens.*

Originality of the paper. *This research offers three key contributions. First, it provides a novel perspective on digital orientation, demonstrating its curvilinear impact on SME performance—an area underexplored in existing literature. Unlike prior studies that assumed a linear relationship between digital transformation and performance, this paper highlights the nuanced dynamics that emerge when SMEs overcommit to digital investments, ultimately leading to inefficiencies and constraints. By adopting this perspective, the study challenges conventional assumptions and offers a more refined understanding of how SMEs should approach digitalization. Second, this research employs an innovative methodology to measure digital orientation, leveraging textual analysis and the Wayback Machine for longitudinal data collection. The use of textual data from SME websites, combined with PCA, allows for a more comprehensive measurement of DO compared to traditional survey-based approaches. This methodological advancement enhances the study's rigor and offers a replicable framework for future research seeking to analyze digital strategies in SMEs. Third, it addresses an empirical gap by analyzing a unique dataset of 250 SMEs over a decade, providing a robust longitudinal perspective on the interplay between digitalization and performance. Unlike cross-sectional studies that offer only a snapshot of digital adoption, this paper examines how DO influences firm outcomes over time, capturing long-term trends and their implications. The findings are particularly relevant for SMEs looking to develop sustainable digital strategies, as they highlight the importance of balancing digital investments to maximize performance without overextending limited resources. Additionally, these insights are valuable for academics and practitioners in navigating the digitalization challenges faced by SMEs.*

Key words: *Digital orientation, SMEs, performance, inverted U-shape, Resource based view, Dynamic capabilities.*

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Digital Tools as Olympionic: Exploring the Real Golden Medal in SMEs Performance

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Abstract

"In the Olympics, the difference between gold and silver is often a matter of milliseconds. Success is determined not only by raw talent but by strategic choices, preparation, and the ability to adapt under pressure".
Digitization offers SMEs a wide range of opportunities, but not all digital tools contribute equally to business success. While some serve as prerequisites for market presence, others can become key drivers of financial performance. This study aims to analyze the strategic role of three key digital tools -website, e-commerce, and social media- in determining SMEs' financial performance over time. Using an Olympics-inspired framework, we classify these digital tools into gold, silver, and bronze based on their impact on SME performance, validating this classification through an empirical analysis based on the Generalized Method of Moments (GMM). The results offer significant managerial implications, providing SMEs with strategic guidance to allocate digital investments effectively.

Framing of the research. *In the world of competitive sports, winning is not just about participation but about making the right strategic choices. The Olympic Games celebrate excellence, determination, and strategic choices that lead athletes to victory. Athletes who reach the Olympic podium fail by chance; they meticulously plan their training, optimize their performance, and make data-driven decisions to outperform their competitors. Similarly, small and medium-sized enterprises (SMEs) must navigate digital transformation with strategic precision and digital decisions to remain competitive in an increasingly digital economy (Bharadwaj et al., 2013). Just as athletes train for years to perfect their performance, SMEs must carefully integrate digital tools to achieve sustainable financial success (Cenamor et al., 2019; Park et al., 2020; Stieglitz & Heine, 2007; Urbano et al., 2024).*

In recent years, digitization has become a key component of business competitiveness, with many enterprises investing in digital tools to improve their performance (Bharadwaj et al., 2013; Nambisan et al., 2019). Digitalization offers SMEs a wide range of opportunities (Appio et al., 2021) but not all digital tools contribute equally to business success. Some serve as basic prerequisites for market presence (Thompson et al., 2013), while others act as key drivers of financial performance (Bhatti et al., 2024). This distinction is crucial because SMEs often face resource constraints forcing them to allocate investments wisely (Park et al., 2020). Firms must determine whether their digital strategies serve as a foundation or as a competitive advantage (Bharadwaj et al., 2013), and whether these strategies generate measurable financial benefits over time (Eller et al., 2020; Matt et al., 2015; Warnke et al., 2024).

However, while large enterprises have established resources and strategies to implement digitization, SMEs face unique challenges, including limited resources and more focused strategic decisions (Benitez et al., 2018; Park et al., 2020; Z. Zhang et al., 2022). Despite the increasing academic attention to digitization, there is still a gap in literature regarding the measurement and evaluation of the impact of different digital tools on SMEs and their performance (Skare et al., 2023). Additionally, researchers call for longitudinal analysis on such topic. Existing indices related to Europe's Digital Decade of European Commission, such as the Digital Economy and Society Index[3] (DESI) and the Digital Intensity Index[4] (DII), while providing a general picture of the level of digitization, do not adequately capture differences across industries, nor do they distinguish between the needs of B2B and B2C businesses as these indicators are at the national level. Researchers have used market indicators using them as proxies for firms and ask to consider firm- and industry-level SME indicators (Skare et al., 2023). They also do not consider the emerging role of innovative digital tools such as social media, which are becoming increasingly central to SMEs.

For innovative SMEs that are unable to pursue growth strategies due to the lack of resources (Benitez et al., 2018; Park et al., 2020; Z. Zhang et al., 2022), one of the main advantages of digital tools is that SMEs enable them to enhance internal communication, processes and access new market opportunities (Bharadwaj et al., 2013; Eller et al., 2020) and

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reduce costs (Proksch et al., 2024). In this context, Website, e-commerce and social media are three different tools that serve and act differently (Lepore et al., 2023; Martínez-Caro et al., 2020; Warnke et al., 2024).

The website represents the essential foundation of SME's digital identity, enabling visibility and credibility in an online-driven economy (Thompson et al., 2013). However, having a website alone may not be sufficient to drive financial success. For that reason, e-commerce could be a helpful strategic expansion that allows SMEs to generate direct revenue by reaching customers beyond physical store limitations (Yeow et al., 2018). While potentially transformative, its effectiveness depends on industry dynamics and execution. The third element is social media, that have emerged as a critical component of digital strategy (F. Zhang & Zhu, 2021), offering SMEs versatile tools to allows the opportunity to conduct business strategically (Ainin et al., 2015; Mount & Martinez, 2014; Testa et al., 2020).

Just as Olympic athletes must make critical decisions about their training regimens, resource allocation, and competitive strategies to secure a place on the podium, SMEs must strategically select which digital tools to prioritize to achieve financial success. However, not all digital strategies lead to gold, and firms must determine whether their investments serve as true performance enhancers or merely baseline prerequisites for participation in the digital economy.

This study addresses the problem of identifying which digital tools actually represent a competitive advantage for SMEs by assessing their impact on business performance. The proposed model introduces an analogy with the Olympic Games, ranking digital strategies according to their ability to generate financial value over time.

Based on this recent literature, the study aims to answer the following questions:

RQ: "Which digital strategy-website, e-commerce, or social media-has the greatest impact on SMEs' financial performance?" and "How is the ranking of digital strategies based on their prevalence among top-performing SMEs confirmed by empirical results in the long run?"

This study aims to bridge that gap by analyzing how three key digital tools-website, e-commerce, and social media-influence SMEs' financial performance over time. Following an innovative approach, our study introduces an Olympic metaphor to rank these tools according to their impact on business performance, assigning them a "gold," "silver," or "bronze" according to their strategic effectiveness. Using longitudinal data on a sample of Italian SMEs from 2013 to 2022 and adopting a methodology based on the Generalized Method of Moments (GMM), our study not only provides a descriptive ranking of the most popular digital strategies among successful SMEs, but also empirically tests whether the perceived ranking correlates with long-term financial growth.

By applying an Olympic podium metaphor, this study provides SMEs with a strategic decision-making framework, enabling them to prioritize digital investments based on measurable outcomes rather than common industry assumptions.

Purpose of the paper. *The objective of this study is twofold. First, we want to create a classification of the most popular digital strategies among high-performing SMEs, identifying which among websites, e-commerce, and social media is most associated with business success. Second, we intend to empirically test whether this classification is indeed indicative of a causal relationship with financial growth in the long run.*

Our work contributes to the literature in three main ways: (i) the introduction of an innovative Olympics-inspired framework in which digital tools are ranked as gold, silver, and bronze based on their contribution to business growth, (ii) use an advanced methodology based on longitudinal data and the Generalized Method of Moments (GMM) to test the validity of the classification based on the DII European index, (iii) we offer practical implications for SME managers, helping them make informed decisions about which digital tools to adopt and which to invest in the most.

Methodology. *To evaluate the strategic effectiveness of digital investments in SMEs, this study employs a two-phase empirical approach that integrates descriptive performance ranking with econometric validation across a sample of Italian Innovative SMEs. This methodology allows us to first classify digital strategies based on their association with high-performing firms and then empirically test whether this ranking remains valid over time. Our analysis focuses on SMEs, where digital presence and customer engagement play a direct role in revenue generation. The dataset consists of longitudinal firm-level data from 2013 to 2022, collected from multiple sources: Digital Economy and Society Index (DESI) that provides country-level indicators on social media adoption, e-commerce penetration, and website presence. However, since DESI and DII operate at the national level, it does not capture firm-specific digitalization. To overcome this limitation, this study utilizes Wayback Machine archives to track the historical adoption of these digital tools at the firm level, ensuring that DESI-based indicators are transformed into company-specific measures. The Wayback Machine is employed to systematically extract and verify historical digital adoption data for each firm, allowing us to construct time-series variables for the website presence (whether and when a firm launched a website), e-commerce functionality (whether the website features an online store) and social media adoption (the presence of business-linked social media accounts over time). For the financial performance metrics, the study used Return on Sales (ROS) that is the primary dependent variable, sourced from AIDA database. Additional controls include ROA, firm size, industry classification, and investment intensity to ensure robust estimations. By integrating Wayback Machine data with DESI indicators, this study provides a firm-specific perspective on digital adoption, bridging the gap between macro-level digitalization trends and individual firm performance. The final dataset comprises 250 SMEs across multiple industries, ensuring a broad sectoral representation while controlling for industry-specific digital adoption trends.*

The first phase establishes an initial digital strategy ranking based on SMEs' financial performance. This is achieved through the following steps: Firms are ranked based on ROA (Return on assets) from highest to lowest over the 10-year period. A weighted performance score is assigned based on the ROA tercile classification. The final score accounts for

longitudinal consistency to mitigate the influence of outliers. Additionally, for each firm, we assess the presence of websites, e-commerce, and social media using Wayback machine for historical records.

We compute the prevalence of each digital strategy among high-performing SMEs to create an initial ranking: Gold to the most frequently adopted digital strategy among high-performing firms; silver to the second most prevalent strategy and finally Bronze to the least prevalent among top-performing SMEs. For the statistical validation of descriptive ranking the correlation analysis between digital adoption and financial performance was employed to establish preliminary relationships. Cluster analysis is applied to detect whether distinct performance groups emerge based on digital adoption patterns. This ranking serves as the basis for empirical validation, testing whether the "gold" strategy is truly the most effective in driving SME financial performance over time.

To test whether the initial descriptive ranking holds over time, we employ a Generalized Method of Moments (GMM) approach between each of the three indicators and financial performance, an econometric technique that accounts for dynamic panel data, endogeneity, and firm-specific heterogeneity.

Results. *Preliminary cluster analysis on SMEs over the period 2013-2022 provides interesting results regarding the hierarchy of adoption of digital tools and their evolution on the Olympic podium over time. Considering the entire 10-year period, the website emerges as the most popular digital strategy among SMEs, followed by social media, while e-commerce ranks third. However, a more detailed year-by-year analysis reveals a significant evolutionary dynamic, reflecting the process of SMEs adapting to technological changes and market pressures. These results challenge the assumption that universal digital adoption equates to financial success, emphasizing the importance of strategic prioritization over broad adoption. Through 2020, the website steadily maintains its position as the most adopted digital tool, confirming it as a key element of SMEs' online presence. E-commerce, initially in second place until 2014, begins to lose ground as of 2015, dropping to third place, while social media-which was the third choice until 2014-gains positions as of 2015, becoming the second most adopted tool. The most striking trend emerges in 2020, when social media overtakes the website, becoming the most popular digital tool among SMEs. This overtaking suggests a shift in the strategic priorities of companies, which are increasingly oriented toward direct and interactive channels of communication with the market, rather than a simple static online presence.*

These results are particularly relevant because they highlight the ability of SMEs to adapt to external inputs and the digital transformation required by the market and the target community. The increasing centrality of social media in the digital landscape of SMEs suggests that companies are meeting expectations for greater interaction, engagement and personalization in their relationship with customers. Moreover, the overtaking of social media over websites can be attributed to the rising of social commerce. Platforms like Instagram, Facebook and TikTok have integrated e-commerce functionalities, allowing SMEs to sell directly through social media, reducing their reliance on traditional e-commerce infrastructure and website and reinforcing social media as a key driver of digital strategy. In addition, the e-commerce decline after 2015 may be related to the increasing competition from large online sales platforms (e.g., Amazon), which have made it more difficult for SMEs to compete with direct channels with low cost.

However, when we analyze the effect of these digital strategies on financial performance, the picture becomes more complex. Preliminary results indicate that the website, while being the most adopted strategy for much of the period analyzed, does not have a significant impact on ROA (Return on Assets). This suggests that a simple online presence is not sufficient to generate measurable financial benefits. In contrast, social media shows a positive and statistically significant relationship with ROA, indicating that SMEs that actively adopt these platforms succeed in improving their financial performance.

These findings open new research perspectives and offer important strategic insights for SMEs. While website adoption remains a necessary foundation for digitization, financial effectiveness appears to be linked to more dynamic digital strategies, such as social media, that enable SMEs to make direct connections with the market, strengthen the brand, and increase customer engagement. The loss of relevance of e-commerce to social media also highlights how SMEs may be more inclined to use digital tools that require lower initial investments and provide a faster return on investment.

Research limitations. *Despite the fresh contribution of this study, there are some limitations intrinsic to its quantitative nature that need to be taken into consideration and may represent insights into future research developments. First, the study focuses on one country, but it is common to most empirical studies on SMEs. Second, we focus on 250 SMEs given the difficulty in gathering data. This is intrinsic to empirical studies, which consider small samples. Third, we acknowledge that other factors (e.g., corporate governance, industry-specific dynamics and organizational culture) may play a role in the relationship between digital tools and SMEs performance. Fourth, measuring digitization in SMEs presents a complex methodological challenge. Our study adopts an approach that combines different sources, including the Wayback Machine to track the historical presence of digital tools. However, this methodology may not fully capture the quality and actual use of these digital tools.*

Managerial implications. *This study introduces a new classification model that evaluates SMEs' digital strategies through an Olympic podium framework, offering a novel approach to assessing the effectiveness of digital adoption. By ranking website presence, e-commerce adoption, and social media usage in relation to financial performance, the study provides insights into how SMEs can strategically allocate digital resources rather than simply following industry trends.*

A key theoretical contribution of this research lies in testing the misalignment between perceived importance and actual financial impact. While some digital tools are widely adopted and often assumed to be critical for success,

empirical validation may reveal a different reality. This study bridges the gap between descriptive rankings, based on prevalence among high-performing firms, and econometric validation, which tests their true financial impact over time. Additionally, this research expands the literature on digital transformation in SMEs by integrating econometric modeling with strategic decision-making frameworks. Existing studies primarily focus on broad digitalization trends, yet few provide a structured framework for ranking digital strategies based on longitudinal financial outcomes. By applying a dynamic panel data approach (GMM), this study contributes a more rigorous, data-driven perspective on digital decision-making in SMEs.

From a managerial perspective, the findings of this study emphasize that SMEs should prioritize digital investments based on financial returns rather than simply adopting digital tools for market presence. While digitalization is often framed as a necessary step for business growth, not all digital strategies contribute equally to long-term financial performance. This research provides a data-driven approach to help SMEs determine which digital tools deliver tangible economic benefits rather than assuming that digital presence alone is sufficient.

In particular, the results suggest that e-commerce and social media strategies may yield higher financial benefits over time compared to websites alone. Although websites are considered a fundamental part of digital infrastructure, their impact on firm profitability may be less direct than interactive and revenue-generating digital tools. This challenges the conventional view that a strong website presence automatically translates into financial success and encourages SMEs to rethink their digital priorities.

Moreover, these findings have direct implications for policymakers. Given the increasing importance of social media as a key driver of SMEs performance, government initiatives and funding programs for digitalization should consider providing more targeted support. Current EU and national policies often focus on broad digital adoption, but future policies could be refined to support the strategic adoption of the most effective tools. For example, governments could support SMEs in identifying which digital tools offer the greatest returns on investment and avoid incentivizing indiscriminate digitization without a clear link to financial performance.

The Olympic-style framework proposed in this study serves as a decision-making tool that enables SMEs to allocate digital resources more effectively. By understanding which digital strategies drive financial performance, managers can optimize their digital investments, ensuring that limited resources are directed toward tools that offer the highest return on investment.

Originality of the paper. *This study stands out for its innovative approach to the analysis of SMEs' digital strategies, filling a significant gap in the literature on corporate digitalization. Much of the existing research focuses on large firms, using standardized digitalization metrics such as the Digital Economy and Society Index (DESI) and the Digital Intensity Index (DII), which, while providing a general overview, do not take into account the structural differences between SMEs and large firms, nor the specificities of the sector or the distinctions between B2B and B2C business models.*

The main contribution of this paper is twofold. First, we propose an Olympics-inspired classification framework that introduces a new way of assessing the effectiveness of digital strategies in SMEs. The use of the podium metaphor (gold, silver, bronze) allows us to overcome the limitations of conventional measurements, offering a clear hierarchy based on the actual financial impact of digital tools. This approach provides immediate operational guidance for SMEs, helping them identify the most effective digital strategies in an environment of limited resources. Second, our study uses a longitudinal analysis based on firm-specific data, overcoming the problem of sectoral heterogeneity and the macroeconomic approach typical of DESI- and DII-based studies. Through the integration of financial data from AIDA with historical digitization data extracted from the Wayback Machine, we offer a more accurate measurement of firm-level digital adoption, filling an important gap in the literature. In addition, the use of the Generalized Method of Moments (GMM) allows us to verify the robustness of the identified relationships, addressing the problem of endogeneity and ensuring more reliable results.

An additional element of originality lies in the consideration of the role of social media as an innovative digital intangible resource. While the traditional literature tends to focus on more established digital tools, such as websites and e-commerce, our study explores the contribution of social media not only as marketing tools, but also as strategic levers for SME growth. This broadens the understanding of the impact of digitization, highlighting how relatively new tools can become key elements for business success.

Finally, our work has important implications for policy makers and managers. The redefinition of digitization metrics suggested by the study invites institutions to develop more refined indicators that consider the specific realities of SMEs and their competitive environment. For managers, the proposed framework provides a strategic compass, helping them avoid ineffective digital investments and focus on tools that can truly generate value in the long run.

With these elements, our study not only contributes to enriching the literature on SME digitization but also offers a practical model for guiding businesses toward a more informed and effective adoption of digital technologies.

Key words: *Digitalization, SMEs, Digital strategy, Financial performance, Digital tools.*

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Driving social impact through innovation: The strategic role of SMEs in B2B markets

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Abstract

Amid increasing pressure for firms to align with societal goals, small and medium-sized enterprises (SMEs) are emerging as underrecognized yet pivotal agents of social innovation. This study investigates how SMEs can embed social objectives into core B2B procurement strategies to promote inclusive economic development, particularly in informal-market contexts. Drawing on an action research case-Juntos Compras con 100% Impacto Social-the paper examines how SMEs, supported by intermediation structures, use social procurement to integrate marginalized producers into formal value chains. Findings reveal that SMEs intentionally reconfigure supply chains not as a response to compliance pressure, but as a strategic act of co-creating social and economic value. By reframing procurement as a socially innovative practice, this research contributes to corporate social innovation (CSI) theory, challenging assumptions of SME passivity and extending the role of procurement beyond transactional efficiency. The study offers practical insights for managers and policymakers on building equity-driven supply networks in emerging economies.

Framing of the research. *In recent years, firms have encountered growing pressure to align their operations with broader societal goals, reflecting an emerging consensus that enterprises, irrespective of size, must balance financial performance with contributions to social well-being (Morsing and Perrini, 2009; Porter and Kramer, 2011; Omowole et al., 2024). This shift, fueled by regulatory changes, rising stakeholder expectations, and voluntary commitments, has prompted firms to embed ethical and social considerations into their strategic frameworks (Morsing and Perrini, 2009). Within this context, small and medium-sized enterprises (SMEs) emerge as critical yet underexplored agents of social innovation, leveraging their economic weight and local embeddedness (Omowole et al., 2024; Stekelorum, 2020). In the European Union, SMEs constitute 99.8% of non-financial businesses, employ 88.7 million people, and average 57 per 1,000 inhabitants (Katsinis et al., 2024), while globally they account for 90% of firms, over half of employment, and up to 40% of GDP in emerging markets (OECD, 2023). Despite their pivotal role in economic development, scholarly focus has disproportionately favored large corporations' capacities for corporate social responsibility (CSR) and corporate social innovation (CSI) due to their resource advantages (Dionisio and de Vargas, 2020; Mirvis et al., 2016), sidelining SMEs' unique strengths-agility, local responsiveness, and grassroots engagement (Dionisio and de Vargas, 2020; Omowole et al., 2024). This gap is particularly pronounced in low-income economies, where informal markets dominate and SMEs' proximity to informal sellers positions them to bridge formal and informal systems, yielding significant social value (Pels et al., 2022; Omowole et al., 2024). Yet, their potential remains under-theorized, marking a critical oversight in management and innovation literature (Saebi et al., 2019; Mongelli and Rullani, 2024).*

Purpose of the paper. *This paper investigates how SMEs can overcome inherent constraints-such as limited financial resources, managerial capacity, and institutional support (Katsinis et al., 2024; Luetkenhorst, 2004)-to drive social innovation through strategic engagement in B2B markets. By integrating social objectives into core strategies, SMEs can foster innovation that not only enhances differentiation, value creation, and sustainability but also stabilizes local economies, promoting social cohesion, legal protections, labor rights, and inclusive growth (Barraket and Loosemore, 2018; Mongelli and Rullani, 2024; Omowole et al., 2024). Central to this inquiry is social procurement, a form of social innovation that reframes purchasing as a strategic tool for social impact beyond transactional exchange (Barraket, 2019; Meqdadi et al., 2020). The study examines Juntos Compras con 100% Impacto Social (Juntos), a commercial intermediary connecting formal businesses with informal vendors through inclusive procurement (Pels, 2024). This case elucidates how SMEs can embed social goals into B2B supply chains, particularly in informal-market contexts, leveraging procurement to catalyze economic formalization and societal transformation (Stekelorum, 2020). By extending existing literature, this research offers a fresh perspective on SMEs as drivers of innovation with enduring societal impact.*

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Social Innovation in the Realm of SMEs. *Scholars have probed social innovation through eclectic theoretical frames, merging economic and sociological insights to dissect its emergence within systemic contexts (Cajaiba-Santana, 2014; Moulaert et al., 2017; Pol and Ville, 2009). Institutional and structuration theories illuminate how social innovation integrates into formal systems, propelled by public, private, or civil society actors (Cajaiba-Santana, 2014; Herrera, 2015; Haxeltine et al., 2016; Moulaert et al., 2017, 2019). Defined as the design and deployment of novel ideas, practices, or offerings to meet unmet social needs, enhance welfare, and spur transformative change (Caulier-Grice et al., 2012; Howaldt et al., 2021; Moulaert and MacCallum, 2019; Pol and Ville, 2009), social innovation targets structural inequities-especially for marginalized groups-with scalability across micro, meso, and macro domains (Cunha and Benneworth, 2020; Grimm et al., 2013). It transcends temporary fixes, fostering systemic shifts through deliberate collaboration, recalibrating power, resources, and community agency (Cajaiba-Santana, 2014; Caridà et al., 2022; Haxeltine et al., 2016; Pel et al., 2020).*

Within the for-profit sphere, CSI melds market logic with societal gain (Dionisio and de Vargas, 2020; Herrera, 2015; Mirvis et al., 2016; Morsy et al., 2024), demanding dual value-social and commercial-via innovative design or supply chain realignment to tap underserved markets (Szegedi et al., 2016). Embedding CSI hinges on an innovation-driven culture, where intrapreneurs catalyze collaboration and actionable outcomes aligned with strategy (Dionisio and de Vargas, 2020; Herrera, 2015; Szegedi et al., 2016). Positioned as a strategic asset, CSI harnesses firm resources-knowledge, skills, R&D-to co-create sustainable solutions, yielding revenue and competitive advantage (Dionisio and de Vargas, 2020; Mirvis et al., 2016). Yet, CSI's institutionalization in SMEs remains underexplored (Dionisio and de Vargas, 2020; Hoogendoorn et al., 2015; Spence, 2016; Wickert et al., 2016), with research fixating on CSR as a reactive, philanthropy-centric response, detached from strategic intent (Morsing and Perrini, 2009; Ortiz-Avram et al., 2018; Yang et al., 2024; Mirvis et al., 2016).

Addressing this lacuna, this study probes SMEs' strategic capacity for social innovation, spotlighting supply chains as a potent yet underutilized arena. In B2B contexts, SMEs grapple with buyer-imposed social and environmental mandates despite resource scarcity (Baden et al., 2009; Stekelorum, 2020), yet their nodal position empowers upstream and downstream influence, amplifying impact potential. Stekelorum (2020) delineates four CSR roles: adopters reactively comply, exploiting agility; blockers resist due to constraints or doubt; generators proactively cultivate trust-based supplier links; and transmitters relay expectations informally. Though illuminating, this frames SMEs as passive or interstitial, sidelining their agency as innovation drivers. This paper reframes SMEs as strategic agent of social value, leveraging social procurement-a practice recasting purchasing as a conduit for societal gain (Barraket, 2019; Meqdadi et al., 2020)-to reshape supply chains sustainably.

Social Procurement as a Social Innovation Practice. *Social procurement emerges as a form of social innovation, reframing procurement as a strategic lever to redress inequities and create value (Barraket, 2019; Meehan and Bryde, 2011; Meqdadi et al., 2020). It harnesses purchasing power to pursue social missions alongside profit, often via sourcing from social enterprises or minority firms-entities owned by those hindered by systemic barriers like capital scarcity or discrimination (Dacin et al., 2010; Blount and Li, 2021; Loosemore et al., 2021). By fueling demand for for-benefit entities, it aligns markets with societal aims, transcending transactional scope (Barraket, 2019; Barraket and Loosemore, 2018; Loosemore, 2016), notably in informal economies where it drives inclusion through jobs and community uplift (Jaroenwanit et al., 2022).*

Implementation demands rethinking norms, forging ties with SMEs and marginalized suppliers to diversify, not streamline, supply bases-fostering equity and formal integration (Meqdadi et al., 2020; Loosemore et al., 2021). Studies underscore its potential-e.g., equitable hiring in construction (Loosemore et al., 2020; 2022)-and drivers like institutional pressures (Razmdoost and Alinaghian, 2024), but flag obstacles: adaptation costs, fragmentation, and skill deficits (Loosemore et al., 2020). Success hinges on governance and "social procurement champions"-actors bridging profit and purpose as visionaries or pragmatists (Loosemore et al., 2022).

Intermediaries amplify this dynamic. Goduscheit et al. (2021) cast them as brokers spanning network voids, while Barraket (2019) outlines their roles: linking actors, rallying engagement, honing skills, championing fields, and legitimizing efforts. These adaptive functions-co-constructed, not static-tackle asymmetries and institutionalize social procurement (Barraket, 2019). Pels (2024) reinforces this, advocating sustained, trust-driven intermediation over fleeting fixes, attuned to marginalized producers' realities. This study harnesses these perspectives to probe how SMEs wield social procurement to forge systemic social value in supply chains.

Methodology. *This study employs action research, blending theoretical inquiry with empirical intervention to generate knowledge and transform practice within complex, multi-actor contexts (Howaldt and Kopp, 2012; Avison et al., 1999; Bradbury and Reason, 2008). Ideally suited to social innovation scholarship, this approach enables a detailed investigation of SMEs' engagement in inclusive procurement within B2B markets. The research is anchored in JUNTOS Compras con 100% Impacto Social, a non-digital marketplace initiative launched by the Inclusive Business Think Tank (ENI) at Universidad Torcuato Di Tella. Developed through iterative cycles of theory-building, practical application, and reflexive learning (Pels, 2024), this initiative reflects a sustained interplay between academic insight and field dynamics, guided by a research team deeply embedded in its evolution.*

Data were drawn from diverse qualitative sources, including internal project records, operational reports, training materials, and recorded stakeholder narratives. Analyzed through an interpretive lens, the study foregrounds the experiences and sensemaking of entrepreneurial actors-particularly SMEs-within the JUNTOS ecosystem. Participant perspectives serve as primary empirical evidence, systematically contextualized and critically examined to uncover

patterns in the enactment of social procurement. This participatory, reflexive methodology aligns with action research's core principles, rooting findings in the lived realities of the initiative's stakeholders.

Juntos Compras con 100% Impacto Social. *Launched in 2018 by the Inclusive Business Think Tank (ENI) at Universidad Torcuato Di Tella, Juntos Compras con 100% Impacto Social (Juntos) is a structured commercial intermediation initiative rooted in action research, designed to tackle economic informality in emerging markets (ENI Di Tella, 2024a). It addresses barriers that hinder marginalized producers' access to formal business-to-business (B2B) markets, promoting equitable trade, local economic development, and inclusive growth through sustainable procurement (Pels et al., 2022). Juntos connects three key actors: Organizational Producers (OPs), SMEs, and supporting institutions. OPs-associative entities like cooperatives or foundations-comprise socially excluded individuals (e.g., unemployed, ex-prisoners, vulnerable groups) across eight sectors, including textiles and gastronomy (ENI Di Tella, 2024b). Though technically adept, OPs often lack managerial expertise and market access (Pels et al., 2022). SMEs, as formal market players, seek socially responsible procurement but face resource constraints, regulatory complexities, and challenges in sourcing reliable informal suppliers (ENI Di Tella, 2024a). Supporting institutions-industry associations, chambers of commerce, and public agencies like the Government of Buenos Aires-enhance SME engagement and institutionalize inclusive practices through capacity-building and policy pilots (ENI Di Tella, 2024b; ITC, 2024).*

Juntos operates via a six-stage intermediation process (Figure 1) that aligns OPs' capabilities with SMEs' procurement needs (ENI Di Tella, 2024a). It begins with selecting OPs based on legal status, production capacity, and market fit, followed by assessing SME requirements (e.g., specifications, volumes, timelines). Matching OPs to SMEs precedes a detailed proposal outlining pricing, social impact, and logistics. Subsequent stages manage payments, production, and delivery, ensuring quality and concluding with transaction documentation and intermediary commission (ENI Di Tella, 2024a). This process bridges social and cultural capital for OPs-offering market connections and skills-while providing SMEs a low-risk pathway to inclusive procurement (ENI Di Tella, 2024b; Barraket, 2019). Since 2018, Juntos has scaled from 4 to 37 OPs (over 700 individuals) and 3 to 45 SME clients, diversifying into eight sectors and enabling year-round sales through cross-selling (Pels, 2024). As a "one-stop shop" for social procurement, it mitigates seasonal income volatility for OPs and integrates them into formal B2B markets, delivering sustained economic and social value (ENI Di Tella, 2024b; Pels, 2024).

Fig. 1: Operational Process of JUNTOS Purchases with 100% Social Impact

Source Guía JUNTOS - Compras y Ventas con 100% Impacto Social (ENI Di Tella, 2024a)

Results. *The following lines explain how SMEs, operating within the framework of the JUNTOS model, contribute to advancing social impact in B2B markets by adopting social procurement as a deliberate social innovation practice. Through this approach, SMEs systematically embed social objectives into their core business operations and strategically reconfigure their supply chains to support inclusive development outcomes.*

As reported through quotations from entrepreneurs affiliated with JUNTOS, featured in reports and video materials (ENI Di Tella, 2024a, b), SMEs' engagement in social procurement practices is neither incidental nor driven by external pressure from larger corporations, as commonly emphasized in the literature on SME compliance with CSR standards (Baden et al., 2009; Stekelorum, 2020). Instead, SMEs intentionally replace existing suppliers with OPs, transforming procurement into a value-driven practice that simultaneously addresses both social and economic objectives. This intentional shift is underscored the founder, who emphasizes: "It is very important to note that the companies we target already have regular suppliers, and our initiative proposes replacing them" (ENI Di Tella, 2024b).

For SMEs, replacing their existing supply chains, as further emphasized by Alberto Patrón, CEO of Condor Technologies, represents a clear departure from conventional CSR models, which are often confined to charitable or philanthropic initiatives. Instead, it reflects a proactive commitment to social procurement as a strategic mechanism for achieving tangible social impact.

"I was one of the first clients, and I remain deeply grateful because JUNTOS created something we needed, even if we didn't realize it at the time (…) We're now a certified B Corporation, focused on impact, but we started doing this before we even knew what triple impact meant. It came from intuition, a desire to be proud of what we do, to win awards, yes, but also to be satisfied with how we do it and how we treat our people. We wanted to know what impact we could have on the community (…) We wanted to help, but often these initiatives can feel like charity. What JUNTOS brings is different: this is not charity, this is mutual value creation! I help someone, and they help me, everyone wins" (Alberto Patrón, CEO of Condor Technologies - ENI Di Tella, 2024b).

Similarly, Alberto García, CEO of Martha Loustau S.A., explained his company's decision to join JUNTOS:

"For a small company like ours, engaging in corporate social responsibility in a systematic way is not easy. (…) Through JUNTOS, we are able to make purchases with social impact, aligned with the Sustainable Development Goals. (…) With the high levels of marginalization in our society, it is impossible to envision a truly sustainable economy. (…) These stark realities compel all of us, as economic actors, to take responsibility for such a complex problem. The people at JUNTOS give us the opportunity and make it easier to contribute our small part" (ENI Di Tella, 2024b).

Diego Lieppe, ViaBana-Grido franchisor, described the decision to engage in social procurement as a natural extension of their core values: "Our mission and vision, the desire to support and empower entrepreneurs, aligned perfectly with purchasing with social impact, so it felt spiritually natural for us" (ENI Di Tella, 2024b).

Unlike multinational corporations, whose procurement systems often exclude informal producers (Barraket, 2019; Meqdadi et al., 2020) due to large-scale requirements, complex compliance procedures, and delayed payment terms, SMEs exhibit operational characteristics that make them more effective enablers of integration for OPs into formal markets. Specifically, SMEs' demand for smaller, customized orders, combined with agile decision-making and limited bureaucratic overhead, supports the development of flexible and adaptive procurement relationships that align with the capacities and constraints of OPs. Within the JUNTOS model, these SME-specific advantages are further enhanced by structured intermediation, which facilitates essential formal procurement processes (including invoicing, delivery scheduling, and payment coordination) on behalf of OPs. This arrangement allows SMEs to pursue socially impactful procurement without incurring additional transactional burdens, thereby lowering the barriers to inclusive supply chain engagement.

Crucially, SMEs also play a direct role in overcoming a key obstacle for OPs, such as the lack of financial resources to acquire raw materials and initiate production. By providing advance payments, typically covering 50 percent of the order value, SMEs enable OPs to begin production in a timely manner, ensuring order fulfilment and supporting their integration into formal economic transactions (ENI Di Tella, 2024a). Rather than perceiving this financial flexibility as a risk, SMEs frame it as a strategic opportunity to generate social value alongside commercial returns, thereby actively contributing to the formalization and economic empowerment of marginalized producers. This intentional strategic orientation is further demonstrated by SMEs' acceptance of the intermediary commission, which has not posed operational challenges or been perceived as a financial burden (ENI Di Tella, 2024a). Its integration into transactions underscores both the financial viability of the model and the trust-based governance that sustains SME-OP collaborations within JUNTOS. As Jaqueline Pels affirms, "Without the trust of our clients, no operation would have been possible, and without the trust of our allies, who enabled us to reach more clients, none of this would have happened" (ENI Di Tella, 2024b).

This trust also shapes SMEs' perception of the intermediary itself, which is not regarded as a cost within the JUNTOS ecosystem, as noted by Jaqueline Pels and further evidenced by the project results presented in the previous section (ENI Di Tella, 2024b). Indeed, SMEs consider it a facilitator of efficient and socially impactful procurement, enabling the seamless integration of social objectives into core business operations. As Alberto Patrón, CEO of Condor Technologies, states, "JUNTOS helped us realize the intention we already had of making purchases with impact. Today, they handle the entire process for us. I recommend it as an opportunity for companies seeking to achieve triple impact" (ENI Di Tella, 2024a). This perspective diverges from much of the literature on CSR and SMEs, which frequently characterizes intermediaries as an added cost and identifies cost-related concerns more broadly as significant barriers that limit SMEs' engagement in socially responsible practices. However, it aligns with the literature on social procurement, particularly with insights on the pivotal role of social procurement champions, who act as boundary-spanners by effectively bridging the gap between commercial imperatives and social purpose (Loosemore et al., 2022).

Through sustained engagement, SMEs actively foster the income stability, product diversification, and growth of OPs, thereby extending their role beyond mere transactional interactions. This tangible impact is substantiated by project metrics, with JUNTOS reporting annual growth rates exceeding 100 percent in both the number of participating OPs and SME clients (Pels, 2024; ENI Di Tella, 2024b). These outcomes have supported the gradual integration and scaling of informal producers within formal supply chains. Moreover, SMEs' involvement, made possible through the intermediation of JUNTOS, helps to bridge what is often referred to as the "market habitus gap," which denotes the cultural and operational disjunction between informal producers and formal buyers (Pels et al., 2022). This is reflected in the words of Martin Luna from Cooperativa Esquina Libertad, who observes: "for us, JUNTOS means the opportunity to access a different type of market that we are not accustomed to or with which we have experienced difficulties, such as the private sector (…)" (ENI Di Tella, 2024a).

Collectively, these actions underscore the pivotal role SMEs play in enabling the integration and growth of OPs within formal markets, not merely as purchasers but as co-creators of inclusive value chains. By combining operational agility

with a deliberate commitment to social procurement, SMEs help overcome structural barriers that typically exclude marginalized producers from formal economic participation.

This finding highlights the transformative potential of SMEs to advance inclusive and sustainable supply chains when supported by intermediation structures that align procurement processes with social impact objectives. Within the JUNTOS ecosystem, procurement evolves from a transactional activity into a strategic mechanism for creating mutual value, where SMEs embed social objectives into core business functions. In doing so, they exemplify the principles of CSI, moving beyond traditional CSR to actively foster the formalization and empowerment of OPs (Dionisio and de Vargas, 2020; Mirvis et al., 2016). Through this lens, SMEs emerge not as passive adopters of responsible practices, but as dynamic agents of social change, reshaping market access, redistributing opportunities, and contributing to more equitable and resilient economic systems.

Research limitations. *While this study provides robust insights into SMEs' role in social procurement, its scope is bounded by several limitations inherent to its design and context. First, the reliance on Juntos Compras con 100% Impacto Social as a single case, situated in Argentina's informal-market context, limits generalizability to other regions or economic settings where SMEs and informal producers face differing structural constraints (ENI Di Tella, 2024a, b; Pels, 2024). The action research methodology, though apt for generating contextual depth and practical insights (Howaldt and Kopp, 2012; Bradbury and Reason, 2008), restricts comparative analysis across multiple cases or quantitative validation of findings, potentially narrowing the scope of causal inference. Second, the qualitative data-drawn from project records, reports, and stakeholder narratives (ENI Di Tella, 2024a)-foregrounds participant sensemaking but lacks longitudinal tracking to assess the durability of SMEs' social procurement practices or their impact over time. Third, the study's focus on SMEs' strategic engagement overlooks potential heterogeneity within the SME category (e.g., size, sector, or resource endowments), which may influence their capacity to adopt inclusive procurement (Katsinis et al., 2024; Luetkenhorst, 2004). Finally, while Juntos's intermediary role is pivotal, the analysis does not fully explore external factors-such as market volatility or regulatory shifts-beyond the Government of Buenos Aires' support (ENI Di Tella, 2024b), which could constrain scalability. These limitations suggest avenues for future research to broaden the empirical and theoretical reach of SME-driven social innovation.*

Implications (for managers and policymakers). *This study unveils social procurement as a strategic fulcrum for SME managers, shifting it from operational routine to a catalyst for innovation and market distinction (ENI Di Tella, 2024a, b). Embedding social value into procurement not only sharpens competitive positioning amid rising ethical and stakeholder pressures but also fortifies legitimacy and trust, aligning SMEs with purpose-driven paradigms (Pels, 2024). Far from a peripheral act, this approach-as modeled by Juntos-enhances resilience in turbulent contexts (Dionisio and de Vargas, 2020). SMEs' local roots, agility, and relational governance uniquely equip them to engage marginalized producers, transforming proximity into a strategic edge (Pels et al., 2022). Managers should thus nurture an innovation-oriented ethos, channel resources into inclusive supply chains, and partner with intermediaries like Juntos to streamline complexity and amplify impact, positioning SMEs as trailblazers in sustainable value creation.*

This research positions SME-led social procurement as a vital market-driven bridge between informal and formal economies, offering policymakers a pathway to alleviate poverty and foster inclusion in low-income settings (ENI Di Tella, 2024a, b). Beyond public-sector mandates (Loosemore et al., 2020; 2022), it elevates SMEs as linchpins of economic transformation, urging policy to transcend state-centric contracting. Interventions must dismantle barriers-transaction costs, resource gaps-empowering both SMEs and informal producers (Pels et al., 2022). Juntos worked with the Government of Buenos Aires and developed capacity-building actions and tools (ENI Di Tella, 2024a, b). This project, exemplifies collaborative governance that amplifies private initiative without overriding it. This partnership model bears normative heft, aligning procurement with decent work (SDG 8), responsible production (SDG 12), and equity (SDG 10), advancing justice in exclusionary contexts (Pels, 2024). Policymakers should thus pivot from regulatory constraints to enabling ecosystems-via intermediary backing, SME incentives, and streamlined regulations-cementing inclusive procurement as a pillar of systemic change (SDG 17).

Originality of the paper. *This study advances management scholarship by reframing SMEs as proactive drivers of social innovation through social procurement, a perspective underexplored in prior literature dominated by large-firm CSR and CSI narratives (Dionisio and de Vargas, 2020; Mirvis et al., 2016). Where prior studies often depict SMEs as resource-constrained or reactive in B2B contexts (Baden et al., 2009; Stekelorum, 2020), this manuscript foregrounds their proactive agency, harnessing agility and local ties to craft inclusive supply chains (Pels et al., 2022). Its originality stems from the empirical anchor of Juntos Compras con 100% Impacto Social, a meticulously documented case that integrates action research with real-world impact, connecting formal SMEs to informal producers in Argentina (Pels, 2024; ENI Di Tella, 2024a, b). Departing from CSR's philanthropy-centric lens (Morsing and Perrini, 2009; Ortiz-Avram et al., 2018), it positions social procurement as a dual-value engine-economic and social-uniquely suited to informal-market settings. By weaving together the "market habitus gap" (Pels et al., 2022) and trust-based intermediation (Loosemore et al., 2022), this paper offers a fresh synthesis of social innovation and supply chain dynamics, delivering actionable insights for managers and policymakers that extend beyond existing theoretical boundaries (Saebi et al., 2019; Mongelli and Rullani, 2024).*

Key words: *social innovation, social procurement, SMEs, informal market, supply chain, JUNTOS*

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Green and digital-driven Innovation Ecosystems: an exploratory text analysis of Smart Specialization Strategies

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Abstract

The paper aims to compare Regional Innovation Ecosystems in Italy, in relations to their sensitivity and propensity towards green and digital issues and also towards the strengthening of their ecosystem. Regional innovation ecosystems represent unique local areas and important platforms for the creation, absorption and diffusion of knowledge, stimulating the innovation process and competitiveness of firms, regions and countries. To this aim, we develop a text analysis of the Smart Specialization Strategy (S3) of each Italian Region. S3 are customized regional strategies addressed to increase their growth and competitive advantage in certain areas of specialization where they hold significant potential, in order that financial interventions can be concentrated there. The present research offers a novel methodological approach based on an exploratory text-based comparative analysis of policy design that uncovers strategic patterns between regional innovation ecosystems undergoing digital and green transitions. It is a preliminary effort to explore how green and digital strategies are designed within such ecosystems, and it is a first step for a future measure of impacts and effectiveness of S3 initiatives on green and digital issues.

Framing of the research. *Regional innovation ecosystems represent unique local areas and important platforms for the creation, absorption and diffusion of knowledge, stimulating the innovation process and competitiveness of firms, regions and countries (Nicotra, 2019; Boschma and Iammarino, 2009; Malmberg and Maskell, 2002). In recent times, the emergence of environmental and social concerns, as well as government demands, has led to the development of innovation ecosystems promoting green and digital innovation, using digital technology and implementing environmental management techniques (Demirel & Kesidou, 2018).*

To strengthen their role, in the last years, the European Union (EU) has adopted a Smart Specialization Strategy (S3), introducing "customized" interventions on regional economic development (Foray, 2015; Barca et al., 2012; McCann & Ortega-Argilés, 2016). It is a strategy that support regions in increasing their growth potential and competitive advantage by helping them identify and strenghen certain areas of specialisation where they hold significant potential, concentrating there financial intewrventions (Camagni et al. 2014; Balland et al., 2019). Such process of identifying the potential of each Regional innovation ecosystems lies on the process of "entrepreneurial discovery" and also on the development of a system of governance involving multistakeholder mechanisms to set strategic priorities and systems of intervention. Hence, regional innovation ecosystems, in Europe, design their development strategy with the aim of fostering the specialisation in such sectors where they possess existing assets, so their most promising areas (McCann & Ortega-Argilés, 2016; Foray, 2015; Fedeli et al., 2019) and within the principles of 'diversified specialisation' (Farhauer and Kröll, 2012). Such european strategy has been implemented for the first time during the EU programming period 2014-2020 and now from 2021-2027. Smart specialisation has become the backbone of the EU Cohesion Policy, as every EU region had to submit S3 strategies in order to be eligible for EU funding.

The national thematic areas are divided into 12 Regional Specialization Areas: Aerospace; Agrifood; Blue Growth; Green chemistry; Design, Creativity, Made in Italy; Energy; Smart factory; Sustainable mobility; Health; Smart, Secure & Inclusive Communities; Technologies for living environments; Technologies for cultural heritage. The evolution of these areas is in line with the National Research Program (PNR) 2021-2027 which is made up of six large thematic areas, directly connected to the UN Agenda 2030: Health; Humanistic culture, Creativity, Social transformations, Inclusion society; Security for social systems; Computer Science, Industry, Aerospace; Climate, Energy, Sustainable Mobility; Sustainable Technologies, Agri-food, Natural and Environmental Resources.

Purpose of the paper. *The purpose of the paper is to compare Regional Innovation Ecosystems in Italy in relations to their sensitivity and propensity towards green and digitalizations themes. We develop an exploratory text-based comparative analysis of Smart Specialization Strategy of each Italian Region. Italian innovation ecosystem and their Smart Specialization Strategies have been already studied (Iacobucci and Guzzini, 2016; Gianelle et al. 2019; Crescenzi et al.2018). However, all such studies are centred on the first EU programming period 2014-2020. In relation to this*

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second program, a concrete picture of regional S3 still not emerge, also because there is still no complete data on this. Moreover, previous studies have generally highlighted the challenges and shortcomings of S3 in Italy, especially in regions with weaker institutional frameworks, where the strategic selection and alignment of priorities remain problematic (Iacobucci and Guzzini, 2016; Gianelle et al., 2019; Crescenzi et al. 2018). Otherwise, the present work aims to perform an exploratory analysis of key features present on S3 strategies in relation to digital and green transition. The focus is on the prevalence of different policy objectives within and across regions, and so the breadth of specialisations per region and the coincidence of specialisations across regions. Clusterization of Italian innovation ecosystems, arising from the analysis, allow to perform future studies on effectiveness and impact of each strategy.

Methodology. *This section describes the procedure employed to analyze each regional Smart Specialization Strategies (S3), as contained in the Smart Specialisation Community of Practice (S3 CoP), the new platform to get informed about data for the period 2021-2027. The analysis is developed by Python-based text processing. First, we install required libraries ensuring that all dependencies needed for PDF text extraction, text processing, and visualization are met. Installing spaCy provides essential language models tailored to Italian, enabling more advanced natural language processing features such as part-of-speech (POS) tagging and lemmatization. To refine our text analysis and exclude context-irrelevant words, we expand Nltk-baseline set of stop words with a custom list which includes words deemed semantically uninformative or overly frequent to reduce noise in subsequent analyses compared to domain-specific terms that are truly indicative of the strategic directions in S3 documents.*

To facilitate thematic categorization in the word cloud, we define a dictionary that assigns color codes to different categories to enable a more intuitive color-based thematic reading of the word cloud.
For instance, "category1" in red includes: "innov", "digital*", "tecnolog*", "soluzioni innovative", "svilup*"; "category2" in green: "verde", "green", "ambient*", "sostenibil*", "circular*", "transiz*"; "category3" in blue: "ecosistem*". If no category is matched, the word defaults to black.*

For each file PDF, PyPDF2 library reads and parses pages, concatenating text into a single string. A safeguard checks whether the file is empty before extraction. For each token, we apply a range of filters to remove punctuation, numeric values, and non-alphabetic tokens. We then check if token's lemma (rather than the token's raw text) is in the set of combined stop words or if it matches certain undesired POS tags (e.g., VERB, AUX, PRON). Excluding these parts of speech is to focus on substantive keywords rather than verbs, conjunctions, or other grammatical items. We eliminate tokens whose length is less than or equal to five characters, except for specific exceptions like "verde" and "green," which are contextually significant. By performing these steps, we obtain a cleaned list of terms that are more relevant to the strategic focus of each region's S3.
Once a set of cleaned tokens is produced, we aggregate their frequencies and the entire process is repeated for each file.

After generating a global frequency distribution, we are interested in counting specific keywords ("verde", "green", "soluzioni innovative", "coesione") and prefixes ("sostenibil", "circular*", "transizion*", "digital*", "ambient*", "innov*", "svilup*", "tecnolog*", "ecosistem*"), representing them in a specific bar chart.*

Next step "compare_word_counts(word_counts_list, top_n=20)" addresses the need to compare the 20 most frequent terms appearing in all files. It then sorts them by their total frequency across files, helping highlight terms of truly overarching importance in the strategies of various regions and displaying them in a bar chart. After this analysis, next algorithm is used to visualize aggregated terms in a word cloud. We filter out terms whose frequency is below a specified threshold (min_frequency=10) to preserve clarity and readability. We generate a word cloud for each S3 document, highlighting region-specific emphases, and then an overall word-cloud by summing up counts across all documents, offering a macro-level perspective on which terms dominate national S3 discourse. We also generate a specific word-cloud to anlyze the main terms co-occurring near "ecosistem", specifically noting the first 20 words that appear most frequently in association with that term which is a key-focus for our research on innovation ecosystems.*

Furthermore, global n-grams (bigrams and trigrams) are generated, with top 10 for each n-gram size displayed graphically and a cosine similarity matrix is computed from TF-IDF vectors of each document, shown through a heatmap.

Finally, a custom function aggregates frequencies of the three categories to identify the predominant one in each region by comparing absolute counts, computes each category's share as a percentage of the total tokens, and presents a stacked bar chart that illustrates, for each region, the relative proportions of each category.

After data standardization, the code performs a K-Means clustering with two clusters (x-axis representing "category1" for digital topic and y-axis representing "category2" for green topic) to group each regional S3 strategy based on its terms' frequencies in these two categories and a scatter plot is generated with each region positioned at its (Digital, Green) coordinates.

Results. *The aggregated outcomes across all 21 regional S3 documents reveal both striking commonalities and notable region-specific priorities.*

*In **Abruzzo**'s S3, "sviluppo" (173) is dominant, followed by "innovazione" (161) and "tecnologia" (102), associable to "digitalizzazione" (30), reflecting region's core commitment to growth through modern solutions. Nonetheless, keywords as "competenza" (58), "transizione" (42), and "governance" (38) underscore a focus on building human capital, overseeing structural shifts, and guiding policy effectively. The additional presence of "mobilità" (38) and "trasporto" (37) hints at targeted improvements in transport and connectivity, while "competitività" (34), "turismo" (33), and "investimento" (33) demonstrate awareness of both external market pressures and internal potential for economic diversification. Abruzzo also addresses cooperations (24) and stakeholder engagement (29), as the importance*

of academic and corporate collaboration ("università", 26; "azienda", 29). These combined elements suggest an overall strategy aimed at balancing infrastructural, technological, and collaborative aspects of regional development.

***Bolzano**'s S3 features a very high count of "innovazione" (369), "sviluppo" (240) and "tecnologia" (158), marking a technology-driven agenda. In line with local sustainability goals, "energia" (109) appears frequently, and "lavoro" (96) signals the region's attention to employment dynamics within innovative economic sectors. "Università" (81), "industria" (74), "competenza" (60), and "digitalizzazione" (59) indicate an interplay between academic research, industrial ecosystems, and the cultivation of specialized skills. Interestingly, "mobilità" (59), "cambiamento" (52), "edificio" (50), and "sostenibilità" (46) hint at Bolzano's concern with building efficiency, forward-looking transport policies, and environmental transitions. "Research" (59), "creazione" (55), and "immagine" (54) strengthen the view that new ideas, branding strategies, and the creation of innovative opportunities form a cornerstone of Bolzano's development model.*

*Moving to **Basilicata**'s S3, "innovazione" (801), "sviluppo" (637), and "tecnologia" (447) dominate the vocabulary, highlighting also this region's robust focus on fostering modern industries and technological ecosystems. Terms like "territorio" (239) and "energia" (212) show that local resources, geographic identity, and energy production figure prominently in Basilicata's vision. The high frequency of "cluster" (206), "impatto" (179), and "risorsa" (176) underscores a multifaceted strategy to create and expand innovation clusters, monitor social or environmental impacts, and leverage available assets. Meanwhile, "patrimonio" (153), "ecosistema" (131), and "infrastruttura" (129) further reveal a commitment to cultural heritage, interconnected innovation networks, and robust foundational systems. Lastly, "crescita" (119), "sostenibilità" (118), and "cambiamento" (115) confirm that Basilicata's plan revolves around sustainable growth, balancing transformative processes with overarching environmental and social considerations.*

*In **Calabria**'s S3, "innovazione" (157), "tecnologia" (149), and "sviluppo" (140) again occupy the top positions. Alongside this institutional focus ("governance", 44; cooperazione", 36; "politica", 35), words as "risorsa" (53) and "economia" (52) highlight the need to harness local economic opportunities, whereas "impatto" (32), "energia" (30), and "turismo" (30) hint at concerns with environmental outcomes and tourism potential. The interest in "competenza" (29), "sostenibilità" (28), "infrastruttura" and "sicurezza" (26) underscores a comprehensive plan oriented toward building skill sets, protecting the environment, and improving the foundations that support technological and economic development, even related to tourism.*

***Campania**'s S3 features high counts of "innovazione" (249) and "sviluppo" (172), with "tecnologia" (79), "investimento" (75), and "cluster" (74) also significant. The emphasis on "ecosistema" (74), "transizione" (63), "industria" (45), "ambiente" (42), "trasporto" (40) reveals a balanced interest in building innovation ecosystems and environmentally conscientious transitions. References to "politica" (42), "conoscenza" (40) mirror Campania's concern for policy frameworks, knowledge sharing, and human capital.*

*In **Emilia-Romagna**'s S3, "innovazione" (516) and "sviluppo" (327) appear alongside "tecnologia" (213), "competenza" (170), and "territorio" (157), illuminating the region's traditional leadership in advanced manufacturing and research organizations. The prominence of "infrastruttura" (154), "lavoro" (147), and "risorsa" (121) showcases an ecosystem that fosters workforce development, invests in physical and digital infrastructures, and leverages natural and organizational resources. Words such as "cambiamento" (113), "ecosistema" (112), "politica" (104), "formazione" and "conoscenza" (101-83), "industria" (87), "transizione" (75) confirm a comprehensive approach that merges technological change with ecosystemic thinking and policy support.*

*In **Friuli Venezia Giulia**'s S3, "sviluppo" (511) and "innovazione" (379) remain highly significant, as "lavoro" (254) and "tecnologia" (191). The region's emphasis on "territorio" (179), "competenza" (124), and "cambiamento" (114) underscores a dual preoccupation with localized needs and transformative processes. The frequencies of "cluster" (113), "formazione" (113), and "collaborazione" (80) further reflect a strong orientation toward networked innovation and skill-building, complemented by references to "transizione" (76), "sostenibilità" (74), and "investimento" (71).*

*In **Lazio**'s S3 "sviluppo" (391), "tecnologia" (269) and "innovazione" (171), "investimento" (168) and "economia" (158) also rank high, reflecting an explicit focus on financing new projects and strengthening the broader economic framework. A noticeable emphasis on "sicurezza" (102), "industria" (99), and "energia" (96) points to policy directions that balance industrial priorities, energy supply, and public security or data protection. "Patrimonio" (88), "risorsa" (80), and "mercato" (63) showcase Lazio's interest in capitalizing on cultural, material, and market assets, whereas "competenza" (62) with "università" (52), "green" (56), and "digitalizzazione" (55), "ambiente" (54), "filiera" (53) denote a move toward more ecological and digital integrated skill sets.*

***Liguria**'s S3 features "innovazione" (199) and "sviluppo" (194) again as top terms, followed by "tecnologia" (172) and "territorio" (131). The region's distinct emphasis on "sicurezza" (66), "digitalizzazione" (47), "industria" (46), "internet" (40) indicates a concern with risk management and digital transformations. Terms like "ambiente" (46), "formazione" (42), "trasporto" (42), "crescita" (42), "trasporto" (42), "'competenza" (40), "investimento" (39), "'energia" (39), "infrastruttura" (37), "collaborazione" (36) attest to Liguria's attention to sustainable development, skill-building, and transportation networks in a territory constrained by coastal geography.*

***Lombardia**'s S3 circles back to "sviluppo" (222), "innovazione" (207), and "tecnologia" (154), but more distinctive is the strong presence of "ecosistema" (102), "territorio" (86), and "cluster" (52), consistent with Lombardia's dynamic industrial fabric and collaborative research communities. The mention of "cittadino" (61), "sicurezza" (51),*

"sostenibilità" (41), "politica" (40), "transizione" (36) and "energia" (33) adds a societal dimension, confirming that technological progress is framed within a citizen-focused and policy-guided approach to modernization.

***Marche**'s S3 favors "innovazione" (262) and "sviluppo" (167), while "mercato" (92), "tecnologia" (90), and "competenza" (80) reveal a keen focus on market integration and skill enhancement. The prominence of "sostegno" (65), "economia" (57), "persona" (55) and "salute" (52) suggests an approach that values social dimensions and direct support mechanisms, with "industria" (54), "investimento" (52), "scienza" (42), "formazione" (44), "cultura" (41), "trasformazione" (43), "ecosistema" (42) and "competitività" (40) further highlighting the region's intent to align industrial growth with comprehensive education and collaborative innovation systems.*

***Molise**'s S3 sets forth "sviluppo" (170) and "innovazione" (145) alongside "territorio" (89) and "investimento" (60), indicating an evolving environment that looks to attract capital and nurture locally embedded growth. "Università" (47), "industria" (46), "competenza" (39) hint that academic-industrial partnerships are formally steered through governance frameworks, while "economia" (40), "crescita" (37), and "transizione" (36) reflect both a commitment to economic expansion and recognition of structural transformations.*

***Piemonte**'s S3 presents "innovazione" (346), "sviluppo" (233), and "tecnologia" (174) as foundational. The presence of "competenza" (89), "investimento" (73), "trasporto" (72), and "economia" (68) indicates a broad strategy touching on human resources, capital infusions, mobility infrastructures, and overall economic health. Additional words as "territorio" (67), "transizione" (66), "crescita" (64), "mobilità" (60), and "impatto" (54), "collaborazione" (52), "salute" (52), "politica" (52), "industria" (52), "risorsa" (51), "lavoro" (49), "manifattura" (43) reinforce the notion of a forward-looking agenda that balances environmental, social, and industrial effects in the region.*

*In **Puglia**'s S3 "innovazione" (348), "tecnologia" (258), and "sviluppo" (247) tie in closely with "filiera" (237), "salute" (203) and "industria" (190), illustrating a pronounced interest in integrated supply chains. "Economia" (174), "competenza" (173), "crescita" (125), "opportunità" (97), "investimento" (94), "ambiente" (91) and "formazione" (86) confirm the significance of industrial competitiveness and specialized skill sets, while "cambiamento" (79), "mercato" (78), and "distretto" (77) highlight the variety of modernization pathways and clustered sectoral organizations.*

***Sardegna**'s S3 again underscores "sviluppo" (292), "innovazione" (264), and "tecnologia" (135) but stands out for giving importance to "territorio" (102), "formazione" (82), "energia" (80), "azienda" (75), and "competenza" (74). "Università" (69), "investimento" (69), "risorsa" (67), "mercato" (63), "turismo" (54), "ambiente" (53) and "politica" (53) reflect a multi-pronged approach aiming at human capital development, energy initiatives, and tourism, underpinned by regional policies and stakeholder collaboration.*

***Sicilia**'s S3 leads with "tecnologia" (368), "innovazione" (339), and "sviluppo" (332), but also highlights "risorsa" (113), "ambiente" (108), and "competenza" (92). These choices underscore the interplay among technological upgrades, resource utilization (including environmental resources), and skill development. Words as "energia" (78), "sostegno" (75), "territorio" (70), "lavoro" (66), "infrastruttura" (51), "policy" (50) and "amministrazione" (50) indicate that Sicilia is marrying infrastructural improvements with supportive governance measures. Meanwhile, "scienza" (64), "transizione" (57), "governance" (56), and "conoscenza" (52) confirm how transitions - both digital and ecological - are anchored in robust administrative structures and knowledge-building processes.*

***Toscana**'s S3 underscores "sviluppo" (355), "innovazione" (336), and "tecnologia" (305), with a distinctive prominence of "università" (204), "opportunità" (198) and "territorio" (188), highlighting the synergy between academic research and economic openings. The high frequencies of "competenza" (144), "investimento" (144), and "transizione" (142) place workforce qualification and transitional processes at the heart of Toscana's policy design. Concurrently, "sostegno" (139), "laboratorio" (128), and "formazione" (115) togheter with "distretto" (108), "trasferimento" (107), "azienda" (105) and topic words as "scienza" (101), "salute" (81), "economia" (81) amplify this agenda of creating supportive ecosystems, research labs, and skill-building pathways in collaboration with industry and academia.*

***Trento**'s S3 emphasizes "sviluppo" (344), "innovazione" (312), "territorio" (214) and "tecnologia" (157) combining advanced technology with place-based identities. "Energia" (92), "sostenibilità" (90), and "lavoro" (90) highlight the region's convergence on sustainable energy solutions and job creation. "Risorsa" (87), "industria" (86), "competenza" (76), and "collaborazione" (70) confirm the significance of industrial partnerships, the development of specialized skills, and collaborative innovation. Parallel threads appear in "crescita" (68), "investimento" (67), "ambiente" (65), and "salute" (61), suggesting a balanced concern for growth, funding, environmental stewardship, and healthcare solutions.*

***Umbria**'s S3 features "innovazione" (279), "tecnologia" (180), and "sviluppo" (168), with comparatively high occurrences of "competenza" (110), "transizione" (70), "risorsa" (64), and "rafforzamento" (58). "Opportunità" (53), "territorio" (53), "politica" (51), and "sostenibilità" (49) rounds out a vision of sustainable, policy-driven development that leverages territorial strengths. Additionally, "investimento" (48), "collaborazione" (40), "azienda" (39) and "cambiamento" (39) point to a multi-actor approach fostering adaptability and constructive transformation.*

*In **Valle d'Aosta**'s S3, "sviluppo" (162), "territorio" (132), and "innovazione" (115) appear together with "tecnologia" (115), "montagna" (59), and "lavoro" (52), making clear that an alpine context strongly shapes strategy. The interplay among "popolazione" (52), "economia" (45), "politica" (44), and "ambiente" (43) reveals a nuanced vision in which demographic, political, and environmental factors converge. The region likewise values training and*

partnerships, as shown by "formazione" (42), "cooperazione" (38), "conoscenza" (37), and "digitalizzazione" (36) but also a specific interest in sector as "energia" (36) and "agricoltura" (35).

*Finally, **Veneto**'s S3 includes "innovazione" (246) and "sviluppo" (224) at the top, alongside "territorio" (214) and "competenza" (172), highlighting that localized development and skill-building are cornerstones of strategic planning. "Transizione" (140), "tecnologia" (119), and "investimento" (115) frame Veneto's path to modernization, while "lavoro" (100), "conoscenza" (95), and "mercato" (92) speak to the diffusion of expertise and market expansion. The frequent references to "crescita" (77), "risorsa" (73), "risultato" (71), "trasformazione" (66), "digitalizzazione" (64), "formazione" (64) and "collaborazione" (61) further articulate Veneto's ambitions to unite resource management with tangible outcomes underpinned by cooperative efforts.*

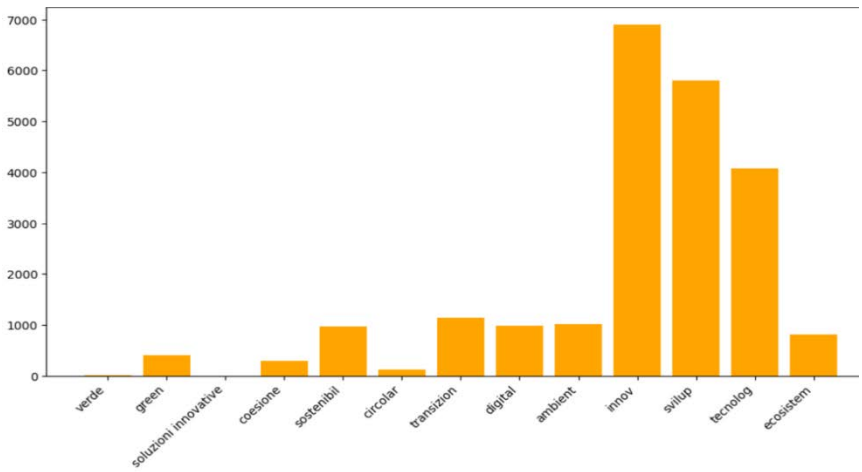
At the national level (Fig.1, 2), terms as "sviluppo", "innovazione" and "tecnologia" emerge as foundational concepts in all documents, albeit with differing levels of intensity. In regions such as Basilicata and Emilia-Romagna, these words reach some of the highest frequencies, reflecting robust industrial or research-based ecosystems. In others - Calabria, Molise, Liguria - the absolute frequencies are smaller, yet the relative weight of similar concepts remains consistent. Likewise, the notion of "energia" appears strongly in Bolzano, Basilicata, and Lazio but is comparatively less emphasized in other regions. "Territorio" consistently ranks among the most common words in nearly all documents, underscoring how place-based development, local assets, and territorial cohesion serve as core components of the S3 approach throughout Italy. "Competenza" and "investimento" follow closely, reflecting the interplay between place-based development, skill-building, and financial resourcing. Words like "lavoro", "economia", "risorsa", "industria", "impatto", "mercato", "sostenibilità", "infrastruttura" are also widely distributed, confirming that employment, economic growth, resource management, and industrial modernization are recurrent themes. "Crescita", "transizione", "ambiente", "università" and "formazione" reveal the systemic orientation toward continuous adaptation - be it digital, environmental, or skill-based.

Fig. 1: Overall word-cloud of regional S3s

innovazione
tecnologia
sviluppo
territorio
economia
competenza
investimento
risorsa
lavoro
industria
energia
formazione
infrastruttura
transizione
cambiamento
politica
crescita
ambiente
università
impatto
salute
mercato
ecosistema
sostenibilità
collaborazione
conoscenza
filiera
sicurezza
opportunità
digitalizzazione
trasformazione
governance
integrazione
risultato
consumo
cooperazione
competitività
domanda
amministrazione
struttura
approccio
diffusione
rafforzamento
società
scienza
cultura
turismo
finanziamento
trasferimento
efficienza
necessità
cluster
persona
condizione
organizzazione
effetto
agricoltura
azienda
iniziativa
interesse
popolazione
esempio
patrimonio
trasporto
elemento
sostegno
occupazione
mobilità
creazione
rapporto
contributo
interno
distretto
pandemia
percentuale
efficacia
esigenza
esperienza
intelligenza
miglioramento
salute
benessere
sinergia
istruzione
performance
maniera
promozione
pianificazione
integrazione
innovation
prospettiva
tecnologia
impiego
categoria
scuola
acquisizione
accumulo
aumento
favore
revisione
resilienza
inclusione
sintesi
incontro
ottica
evoluzione
possibilità
caratteristica
accesso
missione
partenariato
recupera
meccanismo
fabbisogno
caratteri
direzione
adozione
popolazione
interesse
azienda
iniziativa
difficoltà
comunità
spazio
associazione
cittadino
coinvolgimento
controllo
intensità
precisione
fatturato
seguito
fenomeno
idrogeno
emissione
rilievo
considerazione
vincolo
prospettiva
software
situazione
generale
scarto
evento
target
tutela
disposizione
revisione
tematica
fabbricazione
manufacturing
accordo
automazione
eccellenza
fronte
responsabilità
fattore
ricorso
fondazione
utente
metodo
pratica
manifattura
modalità
posizione
posizionamento
design
dettaglio
realtà
ingegneria
giunta
occupato
veicolo
personale
condivisione
incremento
generazione
trattamento
sinergia
istruzione
performance
maniera
promozione
pianificazione
integrazione
connessione
tendenza
miglioramento
intelligenza
esigenza
esperienza
consultazione
logistica
oggetto
unione
scelta
operatore
raccolta
green
implanto
conservazione
utente
fondazione
ricorso
fattore
efficienza
necessità
persona
condizione
organizzazione
effetto
cluster
digitalizzazione
trasferimento
importanza

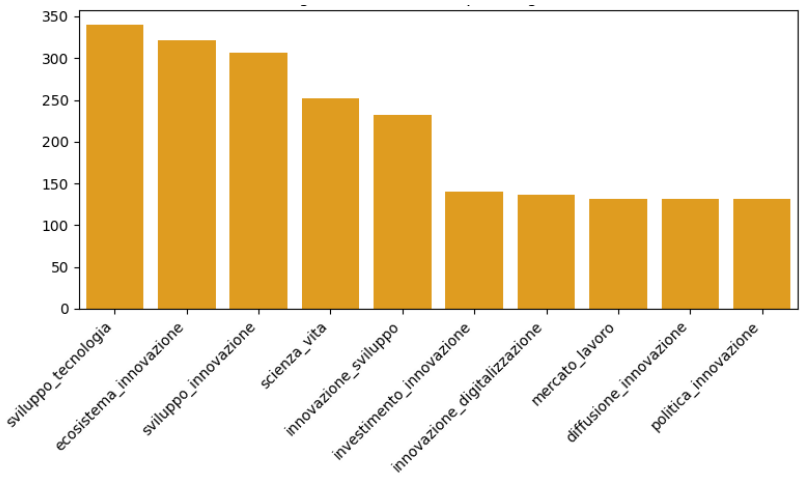
Analyzing specific terms (Fig. 3) likewise demonstrates that environmental sustainability, digital transitions, and ecosystem-based approaches increasingly shape policy discourse, albeit with varying intensity. Turning to specific frequencies, "verde" and "green" have notable, though relatively modest, presences across most documents. "Sostenibil" appears frequently, reaching values as high as 119 (Basilicata) or 90 (Trento). This underscores a common thread of environmental awareness. "Circolar*" varies widely, from minimal occurrences to relatively higher instances in Puglia, Friuli, and Toscana, indicating certain areas are more engaged in circular economy discussions. "Transizion*" also attracts attention, with peaks in Toscana (144) and Veneto (140). Meanwhile, "digital" commonly occurs in reference to digitalization strategies and is particularly high in Friuli (55), Puglia (70), and Toscana (78) together with the top-term "innov*". By contrast, "ecosistem*" is strongly represented in Lombardy (103), Emilia-Romagna (112), and Basilicata (133), showing the specific interest in building interconnected innovation ecosystems in these regions.*

Fig. 3: Frequency of specific words and prefixes for all S3s



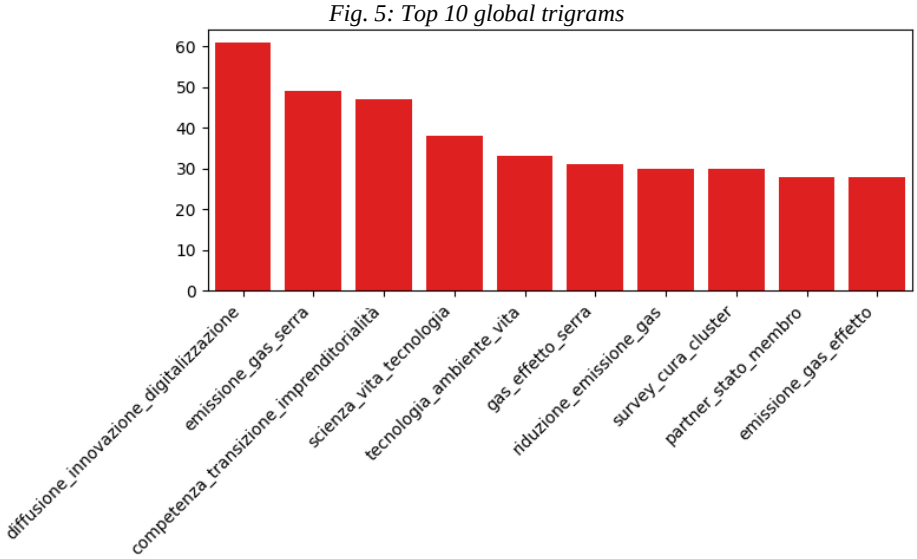
The bigram analysis (Fig. 4) provides further insight into how these concepts interconnect. Pairs such as ("sviluppo_tecnologia", 340), ("ecosistema_innovazione", 321), ("sviluppo_innovazione", 306-232) demonstrate the relevance of development with technology and ecosystem-based approaches with innovation policies. Other bigrams like ("investimento_innovazione"), ("innovazione_digitalizzazione") and ("politica_innovazione") highlight how governance structures are pivotal in directing and financing innovation-driven agendas and further underline how modernization and digital adoption frequently follow direct investment.

Fig. 4: Top 10 global bigrams



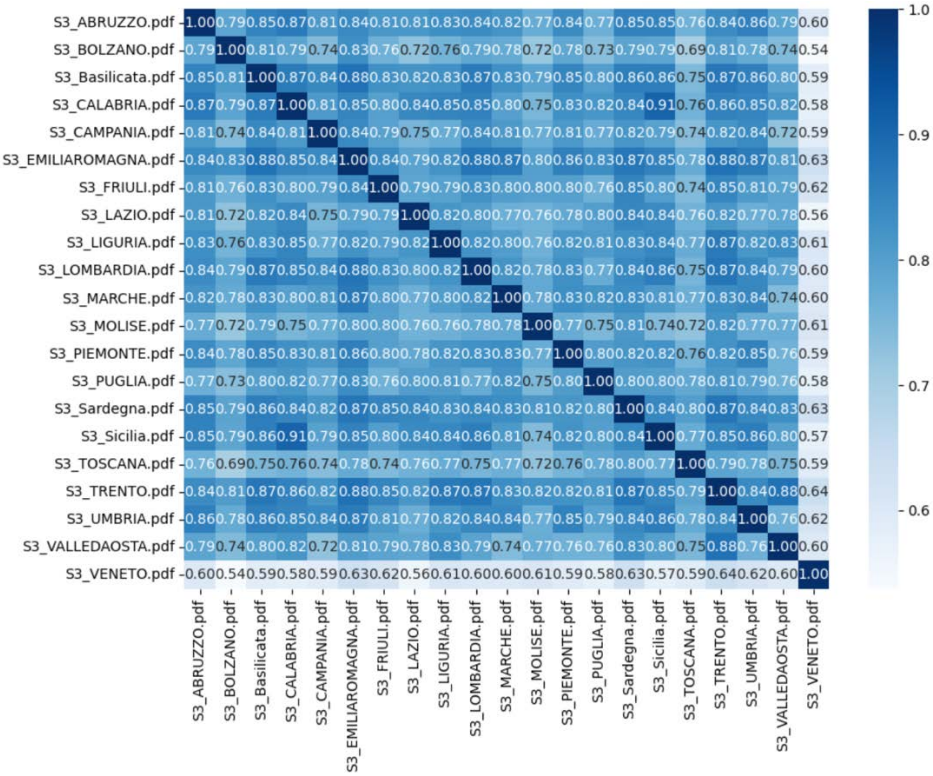
Trigram findings (Fig. 5) as ("diffusione_innovazione_digitalizzazione", 61) indicates that digitalization is not merely an isolated concept but is framed as part of an innovation diffusion process. Terms relating to emissions, greenhouse gases, and environmental care, ("emission_gas_serra"), ("gas_effetto_serra"), ("riduzione_emissione_gas"), ("emission_gas_effetto"), reveal that certain regions include detailed discussions on climate change mitigation strategies. The trigram ("competenza_transizione_imprenditorialità") highlights the synergy between skill-building, transitional policy frameworks, and entrepreneurship, a pattern that indicates a recognized need to support new ventures and entrepreneurial ecosystems during technological or ecological transitions.

Fig. 5: Top 10 global trigrams



The cosine similarity matrix (Fig. 6) compares each regional document by analyzing how closely the distributions of terms resemble one another. When two regions share similar strategic priorities, they score higher in cosine similarity. This typically means that their S3s align semantically, employing common keywords in comparable proportions. Regions emphasizing highly specialized domains tend to display lower similarity, underlining the diversity of Italy's regional approaches even within a shared national framework.

Fig. 6: S3 Cosine Similarity Matrix

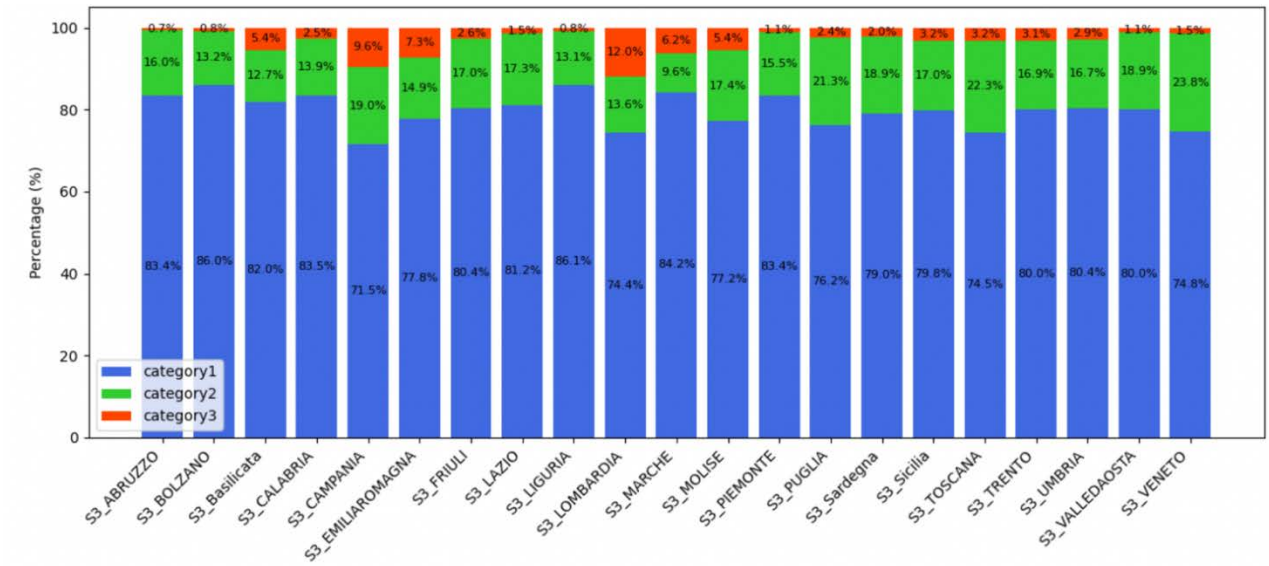


The following word-cloud (Fig. 7) highlights that "ecosistema" functions as a crucial idea, linking diverse themes throughout all S3s. The significant top 20 co-occurring terms as "innovazione," "sviluppo", "tecnologia", "salute", "ambiente" and "biodiversità" underscores the focus on the interplay between technological advancement, sustainable development, and environmental issues. Terms like "risorsa", "collaborazione" and "competenza" imply an expansive emphasis on resource management, collaboration, and skill development. "Transizione", "evoluzione", "cambiamento", "rete", and "rafforzamento" signify a continuous endeavor to modify structures and regulations for the development of more resilient and progressive ecosystems.

Fig. 7: Main co-occurring terms with "ecosystem"

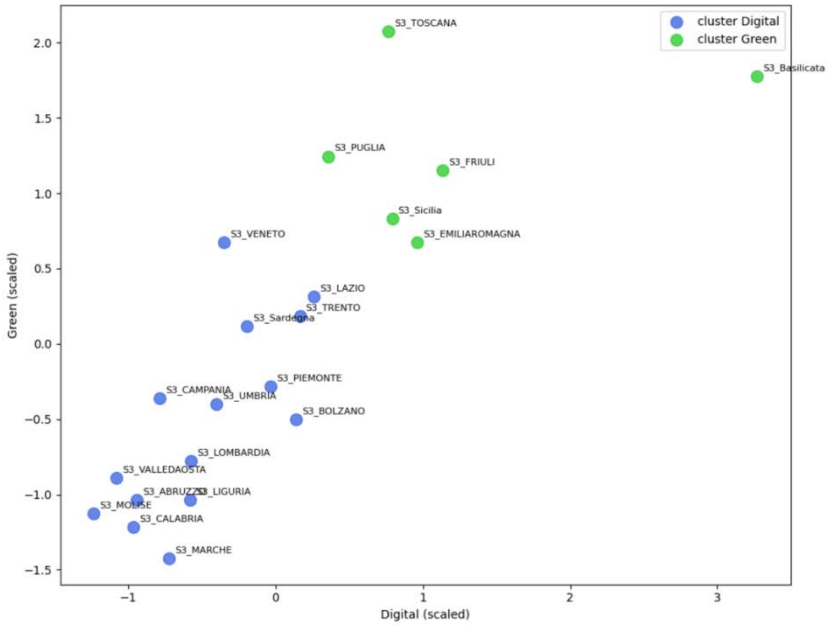
The stacked bar chart (Fig. 8) provides a quick overview of how each region's S3 document balances the three categories of keywords; the relative height of each color segment indicates how dominant that category's terms are in the text. "Category1" (blue) occupies the largest portion, indicating a predominant occurrence of digital terms, while "category2" (green) for green terms has smaller shares and "category3" (red) related to "ecosistem" is minimal but transversal to all regions even if differently exploited.

Fig. 8: Percentage distribution of each category in S3s



K-Means clusterization, after standard-scaling (Fig. 9), indicates that the majority of regions are categorized into the Digital cluster, signifying a more significant number of keywords linked to digital transformation, while a smaller group is categorized inside the Green cluster, signifying a weaker focus on sustainability-related terminology.

Fig. 9: S3s Clustering with K-Means



Research limitations. *The current analysis is a preliminary effort to explore how green and digital strategies are employed within innovation ecosystems. It refers to an Italian context only, for which the results cannot be generalized to different national or European scenarios. Further, S3 documents may have been constrained by several factors, e.g., political imperatives, administrative practices, or other regional limitations, in their ability to capture the textual contents of these strategies, hence potentially influencing the precision and comprehensiveness of the established strategic goals.*

Furthermore, it is essential to understand that strategic design does not necessarily lead to effective implementation. As a result, the strategies identified may differ significantly from actions on the ground, and this study cannot report on the measurable impacts or effectiveness of these S3 initiatives.

Managerial implications. *These insights from the exploratory analysis provide useful information to policymakers by letting them understand the size of their own country's entrepreneurial ecosystems up close, as well as by sharing information on how critical environmental and technological aspects are decisive for entrepreneurship. A detailed comparative perspective makes it easier for policymakers to benchmark their approaches against other region's practices to discern similarites and differences. Through this comparative work, new collaborative opportunities and best practices of effective policies at the local level emerge, identifying models that can be applied to similar territorial areas. For companies it can represents a basis for strategic investment decisions by demonstrating which territories are already aligned with their business models. Moreover, enterprises can use such information to synchronize their strategies with their reference innovation ecosystems better.*

Originality of the paper. *Due to its relatively recent introduction, the effectiveness of Smart Specialisation Strategies (S3) for the period 2021-2027 applications has not been extensively studied, yet academic interest is gradually climbing. While there has been some academic work on previous S3 strategies, to the extent of our knowledge, no systematic assessment has been carried out regarding the level of focus of these S3 strategies and its correlation with the distinctive local economic contexts of the various regions, especially in the perspective of Italy regarding the EU programming period 2021-2027. Hence, the research offers a novel methodological approach based on an exploratory text-based comparative analysis of policy design that uncovers strategic patterns between regional innovation ecosystems undergoing digital and green transitions.*

Key words: *Regional Innovation Ecosystems; Smart Specialization Strategies; Green transition; Digitalization.*

Acknowledgments
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Paradoxes of Public Service Ecosystems: The Case of Digital Pharmaceuticals

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Abstract

This study investigates the paradoxical tensions inherent in digitally transforming Public Service Ecosystems (PSEs), focusing on highly regulated sectors such as digital pharmaceuticals. While PSEs promote co-creation, adaptability, and stakeholder integration, they remain constrained by bureaucratic oversight, regulatory frameworks, and institutional rigidity, generating tensions that cannot be resolved but must be continuously managed. As digital transformation accelerates, these contradictions become more pronounced, requiring new governance approaches that enable multi-actor collaboration while maintaining regulatory compliance and public trust. The digital pharmaceuticals ecosystem, characterized by a shift from a "solo investigator" model to a multi-actor governance structure, provides a relevant empirical setting to investigate how paradoxes shape governance, value co-creation, and service transformation in digital public services.

Using a qualitative case study approach, this study integrates documentary analysis and in-depth interviews with key stakeholders, including regulators, healthcare professionals, technology providers, patient advocacy representatives, and policymakers.

The findings reveal four major paradoxes that emerge at different governance levels, influencing institutional decision-making, service evolution, and actor interactions: (i) User Engagement (Sequentiality vs. Simultaneity): the tension between traditional regulatory gatekeeping and new, multi-channel engagement strategies that accelerate market access; (ii) Data Governance (Data Sharing vs. Data Retention): the contradiction between the need for collaborative data sharing to drive innovation and the strategic withholding of proprietary data to maintain competitive advantages; (iii) Product/Service Lifecycle (Velocity vs. Stability): the misalignment between fast-paced digital innovation cycles and risk-averse, stability-oriented regulatory frameworks that govern approval processes; (iv) Innovation Governance (Stability vs. Reopening): the challenge of managing continuously evolving digital pharmaceuticals, which require ongoing compliance adaptation rather than a one-time regulatory approval. These paradoxes highlight the challenges of balancing control with flexibility, competition with cooperation, and regulatory stability with continuous service evolution. They underscore the need for governance models that do not seek to eliminate contradictions but instead enable actors to manage them dynamically. By revealing how paradoxes shape governance decisions and institutional adaptation, the study advances a paradox-informed approach to digital PSE management, where public and private stakeholders must strategically navigate competing logics rather than resolve them outright.

This research contributes to public management, service research, and digital governance studies by demonstrating that paradoxes in digital PSEs are not transient anomalies but intrinsic structural features requiring ongoing negotiation. The findings emphasize the importance of hybrid governance models, adaptive regulatory mechanisms, and multi-stakeholder collaboration in managing tensions effectively. Future research should explore how paradoxes manifest in different digital PSEs, such as agri-food industry, smart cities, and digital education, using comparative or longitudinal approaches to assess how governance models evolve over time. By positioning paradoxes as fundamental features of digital public service transformation, this study lays the groundwork for future research on paradox-responsive governance models, advancing theoretical and practical understanding of institutional adaptation in multi-actor service ecosystems.

Framing of the research. *The research is theoretically grounded in the Public Service Ecosystem (PSE) framework, employing paradox theory as a conceptual lens to examine the inherent tensions and contradictions that shape governance, innovation, and service co-creation within digitally transforming public services.*

The PSE framework has emerged as a critical perspective in public management and service research, integrating institutional, service, and individual levels of public service delivery (Osborne et al., 2022). Rooted in Service-Dominant Logic (Vargo & Lusch, 2016), it moves beyond hierarchical and dyadic models, emphasizing multi-actor, co-creative interactions at micro, meso, and macro levels that shape public value (Trischler et al., 2023; Troisi et al., 2023a). PSEs conceptualize public services as complex, interdependent systems, where public and private actors, civil society, and

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service users co-create value through resource integration and institutional interactions (Trischler & Charles, 2019). This approach extends Public Service Logic by shifting from a service delivery model to a dynamic network perspective, recognizing public service interactions as evolving within participatory and adaptive governance structures (Osborne, Nasi, & Powell, 2021; Petrescu, 2019).

While the PSE framework advances co-creation and adaptability, it simultaneously introduces paradoxical tensions between stakeholder integration and institutional rigidity (Osborne et al., 2022; Trischler et al., 2023). Digital transformation has further intensified this paradox by enhancing service integration and user-centric co-creation while simultaneously reinforcing bureaucratic constraints, regulatory compliance, and administrative complexity (Troisi et al., 2023b; Akaka & Vargo, 2014; Lindgren et al., 2019; Ciasullo et al., 2018). This duality - where digitalization fosters flexibility yet amplifies institutional rigidities - forces public service organizations to balance competing logics of innovation and control, efficiency and equity, openness and compliance (Walker, Milne, & Weinberg, 2019). Understanding these paradoxes is essential to reconceptualizing how governance models and co-creation processes evolve within digital PSEs, requiring adaptive regulatory frameworks that navigate, rather than eliminate, these tensions (Osborne et al., 2022).

The paradox provides an original theoretical lens to analyze the persistent and interdependent tensions that shape organizational and institutional dynamics (Smith & Lewis, 2011). Paradoxes are defined as contradictory yet interrelated elements that exist simultaneously and persist over time, creating tensions that cannot be fully resolved but must be continuously managed (Lewis, 2000). This key characteristic distinguishes paradoxes from dilemmas, which involve a choice between two competing alternatives where resolution is possible through trade-offs (Schad et al., 2016). While dilemmas are addressed by prioritizing one alternative over another, paradoxes require a "both-and" approach that embraces competing logics simultaneously, fostering long-term adaptability and organizational sustainability (Putnam, Fairhurst, & Banghart, 2016). Unlike private organizations, which often navigate dilemmas through strategic prioritization, public sector organizations operate in environments where conflicting demands, e.g., efficiency vs. equity, innovation vs. compliance, or centralization vs. decentralization, must be managed rather than resolved (Osborne et al., 2022). This persistent "tug-of-war" between opposing imperatives makes paradox theory particularly relevant for understanding the complexity of PSEs in the era of digital transformation.

The application of paradox theory to public administration research has revealed that bureaucratic and post-bureaucratic models do not simply replace one another but rather coexist in a dynamic, paradoxical relationship (Ingaggiati et al., 2024). Bureaucracy, characterized by hierarchical control, standardization, and compliance, often clashes with post-bureaucratic governance, which emphasizes flexibility, co-creation, and participatory decision-making (Torfing et al., 2020). This creates paradoxical tensions, as public organizations must balance regulatory stability with the need for innovation and responsiveness (Hood & Peters, 2004). A recent systematic review of paradoxes in public administration (Ingaggiati et al., 2024) identifies three overarching categories of paradoxes in public administration:

- *Plurality Paradoxes - Resulting from the multiplicity of actors, goals, and institutional layers in public administration. Public organizations must balance top-down governance with bottom-up participatory approaches while ensuring that diverse stakeholders contribute to service co-creation without compromising institutional coherence.*
- *Change Paradoxes - Reflecting the tension between stability and transformation. Public organizations are required to innovate and adapt to emerging societal needs (e.g., digital transformation, sustainability), yet they must operate within highly institutionalized, rule-based frameworks that resist change.*
- *Scarcity Paradoxes - Emerging from the trade-offs required in resource allocation, as public services must optimize efficiency while maintaining accessibility, equity, and quality under budget constraints.*

These paradoxes are not mere contradictions but deeply embedded tensions that shape how public services are structured, delivered, and governed.

Purpose of the paper. *The Public Service Ecosystem (PSE) framework has gained prominence in public administration and service research for its multi-actor, co-creative perspective on public service delivery. However, despite its conceptual advancements, existing literature has yet to fully account for the persistent tensions and contradictions that emerge as public services undergo digital transformation. While PSE theory emphasizes adaptive governance, stakeholder integration, and value co-creation, it remains constrained by institutional and regulatory boundaries, which often generate structural paradoxes that are not easily reconciled.*

Similarly, paradox theory has been widely applied in organizational studies to analyze how actors navigate contradictory yet interdependent logics within institutions. However, its application to digitally transforming PSEs remains underexplored, particularly in relation to how bureaucratic stability and regulatory oversight interact with market-driven service evolution, digital innovation, and multi-actor governance structures. Existing studies have primarily framed governance challenges in public service contexts as dilemmas to be solved through strategic trade-offs, rather than persistent paradoxes that require continuous negotiation and institutional adaptation.

This study bridges these theoretical gaps by integrating paradox theory with the PSE framework to investigate how paradoxical tensions shape governance, value co-creation, and service transformation in digitally evolving PSEs. Focusing on the digital pharmaceuticals sector-characterized by a fundamental shift from a "solo investigator" model to a multi-actor governance structure involving regulators, researchers, healthcare professionals, patients, and technology providers operating under competing institutional logics (Carrera et al., 2023)-the study positions the paradox-informed framework as theoretically transferable to other digitally transforming PSEs. This sector exemplifies

the tensions and opportunities triggered by digital transformation in regulated service environments, where co-creation and innovation are increasingly entangled with regulatory compliance and bureaucratic control (Carrera et al., 2024).

Complex ecosystems such as smart cities and digital education share key features of PSEs, including multi-actor configurations, institutional embeddedness, and service co-creation dynamics (Osborne et al., 2022; Trischler & Charles, 2019). These sectors also grapple with enduring tensions-between agility and accountability, personalization and standardization, innovation and compliance-that closely mirror the paradoxes identified in healthcare. Rather than temporary dilemmas, such tensions are structural and must be continuously negotiated. Applying a paradox lens facilitates a "both-and" perspective, revealing how conflicting institutional logics co-exist and shape governance and service transformation across digital PSEs (Ingaggiati et al., 2024). By analyzing the digital pharmaceuticals ecosystem as a paradigmatic case of digital PSEs, this study seeks to address the following research question: Which paradoxes emerge in digital PSEs?

Methodology. *This study employs a qualitative case study approach (Yin, 2018) to explore the paradoxical tensions shaping governance, value co-creation, and institutional adaptation in digitally transforming Public Service Ecosystems (PSEs), with a focus on digital pharmaceuticals. The digital pharmaceuticals ecosystem was theoretically and empirically selected based on its relevance to the research question, as well as being an instrumental case due to its alignment with the institutional and governance dynamics typical of digitally transforming PSEs. Positioned at the intersection of stringent regulatory frameworks and rapid technological advancement, it offers a paradigmatic context in which paradoxes - particularly those involving co-creation, compliance, and innovation - become highly visible. Importantly, as smart cities and digital education, where multi-actor governance, public-private interdependence, and institutional embeddedness converge (Trischler & Charles, 2019; Osborne et al., 2022).*

Data collection followed a triangulated approach, beginning with a documentary analysis of regulatory filings, clinical trial protocols, and policy guidelines to map the institutional constraints and governance mechanisms shaping the sector. This phase was followed by five in-depth semi-structured interviews with key stakeholders, including private and for-profit technology providers, regulators, public healthcare professionals (also acting as key opinion leaders), representatives from patient advocacy associations, and public policymakers. The interview protocol was designed using paradox theory, allowing for a structured investigation of how actors perceive, navigate, and manage paradoxical tensions within the ecosystem.

Data analysis employed a structured thematic coding process. Initial open coding was applied to identify recurring concepts from stakeholder narratives, which were subsequently refined into higher-level categories via axial coding. This process was guided by paradox theory to reveal underlying paradox poles (e.g., control vs. flexibility). Coding was performed manually to ensure data traceability and analytical depth. Regular review sessions with the senior co-author supported iterative codebook refinement, ensuring consistency and enhancing methodological transparency and rigor throughout the analysis.

Following Yin's principle of analytic generalization, findings were developed to inform broader theoretical insights beyond the digital pharmaceuticals case. The identified paradoxes were abstracted into transferable themes relevant to other digitally transforming PSEs. Transferability was supported through rich contextual description and theory-driven interpretation, enabling practitioners and researchers to assess applicability across comparable PSE contexts. This reinforces the study's external validity by connecting case-specific dynamics to wider governance and co-creation challenges, offering transferable understanding for other public service domains undergoing digital transformation and facing comparable governance complexities.

Results. *This section presents the findings of our empirical analysis, which aimed to investigate the types of paradoxes emerging within Public Service Ecosystems (PSEs), with a specific focus on how they are reshaped by next-generation digital transformation. Drawing on the classification proposed by Ingaggiati et al. (2024), our study highlights how paradoxes identified in traditional public administration are exacerbated or reconfigured within digitally transforming PSEs, due to their distinctive service logic orientation, which, in contrast to broader ecosystems, is often driven by private sector innovation yet remains embedded in public regulatory constraints. The results, shown in Table 1, reveal four major paradoxes that characterize the governance, value co-creation, and institutional dynamics of digital pharmaceuticals, each occurring at different levels of the ecosystem and reflecting distinct tensions between actors.*

As shown in Table 1, the "Implications for PSE" column demonstrates that each identified paradox extends beyond the digital pharmaceuticals case and is structurally embedded in digitally transforming Public Service Ecosystems. The tensions-such as sequential vs. simultaneous user engagement, data sharing vs. retention, and innovation velocity vs. regulatory stability-are emblematic of broader governance dilemmas across sectors. Similar patterns appear in smart cities and digital education, where actors must balance agility with compliance and openness with control. These recurring contradictions are not isolated, but deeply rooted in the institutional fabric of digital PSEs (Osborne et al., 2022; Trischler & Charles, 2019; Ingaggiati et al., 2024). As such, the findings substantiate the analytical transferability of our paradox-informed framework to other complex, multi-actor public service contexts.

Table 1. Paradox poles identified according to the level where occur.

Paradox Pole	Level of Occurrence	Tension Type	Key Actors Involved	Implications for PSE
#1. User Engagement: Sequentiality vs. Simultaneity	Service Delivery Level	Control vs. Flexibility	Regulators, Digital Pharmaceuticals Developers, Healthcare Providers	Challenges traditional regulatory gatekeeping, leading to multi-channel engagement strategies
#2. Data Governance: Data Sharing vs. Data Retention	Network Governance Level	Competition vs. Cooperation	Regulators, Public and Private Data Holders, Healthcare Providers	Reveals the strategic retention of data within co-opetitive ecosystems, requiring adaptive data-sharing policies
#3. Product/Service Lifecycle: Velocity vs. Stability	Institutional Level	Risk Propensity vs. Risk Aversion	Regulators, Technology Developers, Investors, International Competitors	Exposes the misalignment between regulatory stability and the rapid iteration cycles of digital health technologies
#4. Innovation Governance: Stability vs. Reopening	Institutional & Ecosystem Level	Standardization vs. Adaptability	Regulators, Research Institutions, Public Health Agencies, Industry Partners	Highlights the perpetual renegotiation of governance frameworks due to ongoing technological evolution and ecosystem transformations

Paradox Pole #1 - User Engagement: Sequentiality vs. Simultaneity

Public Service Ecosystems (PSEs) traditionally follow a sequential model where regulatory bodies act as gatekeepers, controlling access to pharmaceuticals and medical innovations. This ensures compliance and patient safety but slows innovation. However, digital pharmaceuticals disrupt this process by enabling simultaneous user engagement before regulatory approval. Technology firms, patient advocacy groups, and venture capital investors increasingly interact with users to collect real-world data, refine business models, and accelerate commercialization. While regulators attempt to reinforce compliance barriers, private actors often navigate these restrictions through alternative mechanisms such as real-world evidence studies. This paradox underscores a shifting power dynamic, where public-sector authority is increasingly challenged by private-sector actors leveraging digital affordances.

"[..] We can't wait for each bureaucratic gate to open when new tools let us involve patients and doctors simultaneously to accelerate access [..]" (Patient Advocacy Representative, 2024).

Paradox Pole #2 - Data Sharing vs. Data Retention

At the network governance level, digital PSEs experience a fundamental tension between collaboration and competition in data governance. While regulators, public health agencies, and private firms acknowledge the necessity of data sharing for innovation and patient outcomes, actors also strategically retain critical datasets to maintain competitive advantages. Open data policies exist, yet in practice, each stakeholder selectively withholds proprietary insights-non-profits to preserve credibility, private firms to protect market position, and public agencies to prioritize regulatory oversight. This paradox is not a flaw but an intrinsic feature of digital PSEs, where data asymmetry shapes power structures and innovation trajectories. Effective governance must acknowledge this reality and develop mechanisms that balance selective transparency with cooperative exchange.

"[..] There is a constant tension. Everyone agrees sharing is beneficial, yet they worry that opening up will weaken their competitive edge [..]" (Regulator, 2024).

Paradox Pole #3 - Product/Service Lifecycle: Velocity vs. Stability

The institutional governance of digital pharmaceuticals reveals a clash between the rapid innovation cycles of digital health technologies and the slow, risk-averse nature of regulatory frameworks. Traditional drug approval processes are lengthy and stability-oriented, ensuring safety and compliance before commercialization. However, digital pharmaceuticals-especially those incorporating Artificial Intelligence (AI) and real-time software updates-evolve continuously, demanding faster regulatory adaptation. While conditional approvals and post-market surveillance exist, institutional inertia and legal complexities often impede commercialization, delaying access to life-enhancing innovations. This paradox highlights the misalignment between regulatory stability and the agility required in digital health ecosystems, creating friction between public oversight and market-driven technological evolution.

"Our platform can roll out improvements monthly. [..] We want to move fast and iterate, yet we are held back by a regulatory framework designed for a much slower pace." (Technology Provider, 2024).

Paradox Pole #4 - Stability vs. Reopening

At the ecosystem level, digital pharmaceuticals challenge the traditional linear innovation model, which assumes regulatory approval as a fixed milestone. Instead, these technologies undergo continuous updates, expansions, and refinements, requiring repeated reassessments of compliance, governance, and stakeholder roles. Unlike conventional drugs, which maintain stable clinical applications, digital pharmaceuticals function as dynamic service platforms, evolving with algorithmic modifications, new data inputs, and extended functionalities. This paradox reflects a persistent interplay between regulatory standardization and technological adaptability, where governance structures must constantly renegotiate service boundaries. Rather than reaching a definitive regulatory endpoint, digital pharmaceuticals remain in iterative evolution, necessitating adaptive regulatory frameworks that balance innovation with accountability and safety.

"With traditional medications, approval is a one-time milestone. We need a stable regulatory framework that can adapt to constant innovation [..]it is a sort of real balancing act" (Healthcare Professional, 2024).

Research limitations. *This study does present some limitations. The analysis is based on a single empirical context (i.e., digital pharmaceuticals), which, although the theoretical framing and analysis, it is worthy to extend to other sectors. Future research should explore how paradoxes manifest in different public service domains, such as agri-food industry, smart cities, and education. Additionally, the study employs qualitative in-depth interviews, offering rich, contextualized insights but limiting broader applicability. Further investigations could adopt quantitative methods, cross-case comparisons, or longitudinal analyses to examine how paradoxes evolve over time and across institutional settings.*

Managerial implications. *The findings underscore the need for adaptive governance strategies that enable public and private actors to effectively navigate paradoxical tensions in digitally transforming Public Service Ecosystems (PSEs). Rather than enforcing rigid regulatory frameworks, policymakers should embrace more flexible, hybrid governance models that balance bureaucratic oversight with innovation facilitation. Addressing paradoxes such as user engagement, data governance, lifecycle velocity, and innovation stability requires rethinking policy instruments, fostering cross-sectoral dialogue, and integrating modular regulatory approaches that allow for iterative adaptation without compromising compliance and public trust. Public administrators and industry leaders must acknowledge that paradoxes are not temporary obstacles but enduring characteristics of digital PSEs, necessitating continuous negotiation, institutional reflexivity, and collaborative problem-solving across stakeholders.*

Originality of the paper. *This study offers a novel contribution by theoretically applying paradox theory to the analysis of digitally transforming Public Service Ecosystems (PSEs), an area that remains underexplored in both public administration and service research. While existing literature has largely conceptualized regulatory challenges and innovation constraints as trade-offs to be balanced, this paper reframes these tensions as persistent paradoxes that are not meant to be resolved but rather continuously navigated through adaptive governance mechanisms and institutional negotiation. Unlike previous studies that have treated bureaucratic constraints and service innovation as competing forces, this paper demonstrates how they coexist in a dynamic, paradoxical relationship, shaping governance, value co-creation, and institutional adaptation in digital PSEs. The four paradoxes identified, which are related to user engagement, data governance, product lifecycle, and innovation governance, illustrate that PSEs are structurally defined by contradictory yet interdependent logics that demand flexible, multi-actor governance models rather than rigid policy prescriptions. By empirically investigating how these paradoxes manifest in digital pharmaceuticals, the study extends the theoretical discourse on paradox-informed governance in public service contexts, showing that institutional rigidity and technological dynamism are not mutually exclusive but rather shape one another through iterative adaptation. This insight challenges linear, resolution-based approaches to governance and introduces a more nuanced perspective that acknowledges paradoxes as enduring and constitutive features of digital public service transformation.*
Additionally, this research contributes to the theoretical advancements of PSE theory by demonstrating that service logic within digital PSEs is uniquely shaped by paradoxical tensions that emerge at multiple governance levels. The findings reveal that service co-creation in digital PSEs differs from broader ecosystems due to its entanglement with bureaucratic oversight, regulatory adaptation, and institutionalized stakeholder interdependencies. This perspective refines existing PSE scholarship by emphasizing the necessity of paradox-responsive governance models that account for the fluidity of service interactions, the evolving role of public and private actors, and the persistent negotiation between institutional control and market-driven transformation.

By positioning paradoxes as fundamental characteristics of digital public service evolution, this study lays the groundwork for future research on how paradox theory can inform governance innovation in regulated PSEs, contributing to ongoing debates in public management, service innovation, and institutional theory. Through this approach, the study moves beyond traditional regulatory frameworks and calls for the development of governance models that embrace, rather than attempt to suppress, paradoxical tensions in digital public services.

Key words: *paradox; public service ecosystem; digital transformation; governance; digital pharmaceuticals.*

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The power of diversity: How female leadership drives innovation and performance in SMEs and Deep Tech

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Abstract

Gender diversity in top management teams (TMTs) is increasingly recognised as a strategic factor influencing firm performance, particularly in innovation-driven environments. While extensive research has examined the relationship between female leadership and corporate outcomes in large firms, the impact of gender diversity within small and medium-sized enterprises (SMEs) remains underexplored. This study aims to fill this gap by analysing how gender diversity in TMTs affects firm performance in innovative SMEs, focusing on the moderating role of innovation. Using a dataset of 2,323 Italian innovative SMEs operating between 2015 and 2023, this research employs a quantitative approach to assess the relationship between gender diversity, firm performance, and innovation. Specifically, the study investigates whether the presence of female managers enhances firm performance and whether this effect is amplified in highly innovative firms. Additionally, it explores the role of gender diversity in deep tech firms, where long-term investment and high technological uncertainty create unique leadership challenges. This study is among the first to examine the intersection of gender diversity, innovation, and firm performance within SMEs and the emerging deep tech sector. The expected findings suggest that gender-diverse TMTs contribute positively to firm performance, with a more substantial effect in innovation-intensive environments. The study provides new insights for managers, policymakers, and investors, emphasising the importance of fostering inclusive leadership to drive competitiveness and sustainable growth.

Key words: *Gender Diversity, Top Management Teams, Innovation, Firm Performance, SMEs, Deep Tech.*

Framing of the research. *Female representation in senior management remains limited, with women holding only 29% of executive positions globally (Grant Thornton, 2022). Significant regional disparities persist, with female executives accounting for 36% of leadership roles in Europe but only 16% in the Middle East and North Africa (Hanna et al., 2023). This ongoing underrepresentation emphasises the gap between the recognised strategic value of gender diversity in corporate governance and performance and its actual integration into leadership structures (Lewellyn & Muller-Kahle 2020; Achkar & Bouri, 2021). In today's increasingly complex and dynamic business environment, diverse leadership teams are widely recognised as strategic assets that drive innovation, enhance adaptability, and improve decision-making effectiveness (Hambrick & Mason, 1984; Nielsen & Huse, 2010; Jones et al. 2020). In particular, gender diversity within Top Management Teams (TMTs) has garnered growing scholarly attention for its potential to strengthen organisational outcomes by incorporating a broader range of perspectives, cognitive skills, and leadership styles (Post & Byron, 2015; Li et al. 2016)*

Managerial and social theories have long demonstrated the significance of diverse leadership team composition within organisations, particularly the inclusion of women. Upper Echelons Theory posits that senior executives' characteristics, values, and experiences shape how firms identify opportunities, manage risks, and allocate resources (Hambrick & Mason, 1984). Within this framework, gender diversity enhances decision-making by introducing a broader range of viewpoints and problem-solving approaches, mitigating groupthink, and fostering innovation (Carter, Simkins, & Simpson, 2003). Diverse leadership teams are better equipped to anticipate market trends, respond to emerging challenges, and develop sustainable long-term strategies. Social Role Theory (Eagly, 1987) adds that women often exhibit leadership styles characterised by collaboration, empathy, and transformational behaviours-qualities that complement the traditionally risk-oriented and competitive styles more frequently associated with male leaders (Post & Byron, 2015). This balance fosters a more inclusive decision-making environment, encouraging considering a broader range of perspectives and ultimately leading to more effective strategic outcomes. However, the Critical Mass Theory posits that

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a minimum threshold of woman representation in leadership is needed to fully realise the benefits of diversity (Kanter, 1977). When women make up only a tiny fraction of leadership teams, as is the case today, their influence is often limited by tokenism and entrenched power structures. In contrast, Resource Dependence Theory argues that leadership teams should reflect the external environment and key stakeholders to respond effectively to market demands (Pfeffer & Salancik, 1978; Russo & Fouts, 1997). Accordingly, firms with gender-diverse leadership may be better equipped to understand and address the expectations of their diverse customer base, investors, and regulatory bodies, thereby strengthening stakeholder relationships and enhancing corporate reputation. These theories assert that gender diversity in TMTs is not merely a social or ethical issue but a strategic advantage that enhances long-term corporate competitiveness. Organisations with diverse leadership teams are better equipped to navigate contemporary business challenges and capitalise on emerging opportunities in an increasingly competitive global market.

Over the past decades, empirical research has consistently reinforced this perspective, demonstrating the positive impact of gender-diverse leadership on firm performance. In the early 2000s, Singh et al. (2001) examine women's challenges and opportunities in leadership roles within top UK corporate boards. Their findings suggest that the role of gender diversity extends beyond fostering a more inclusive leadership culture, as it also strengthens corporate governance and decision-making. Other studies have identified a positive correlation between gender diversity in leadership and firm performance, particularly in industries that rely on innovation and adaptability, where the broader perspectives and open-mindedness associated with female leadership can provide a competitive advantage (Smith et al., 2006; Campbell & Mínguez-Vera, 2008; Dezső & Ross, 2012). Post and Byron (2015) reinforced this link, associating female representation on the board with improved financial performance, particularly in countries with strong gender equality norms. They attribute this effect to enhanced inclusivity and collaboration, strengthening internal decision-making and aligning corporate strategies with broader societal values, including gender equity. More recent studies provide a more nuanced understanding of the impact of gender diversity in leadership. Low et al. (2015) emphasise that its impact varies depending on external factors such as industry competitiveness and technological intensity. Arvanitis et al. (2022) report that the effects of gender diversity on firm performance depend on factors such as company size and industry. Similarly, Dwivedi and Paolella (2023) examine the cross-level effects of women's representation in senior management, highlighting that while gender diversity initiatives drive visible change, their impact varies across organisational levels.

Beyond economic and financial performance, gender diversity is a key driver of organisational innovation. This is particularly relevant for firms managing substantial intellectual property portfolios, where diverse leadership fosters creativity, promotes inclusive problem-solving, and enhances organisational learning (Torchia et al., 2011). Innovation has been recognised as a crucial moderator that strengthens the positive relationship between gender diversity and organisational outcomes (Østergaard, Timmermans, & Kristinsson, 2011; Díaz-García, González-Moreno, & Sáez-Martínez, 2013). From this perspective, Dezső and Ross (2012) demonstrate that female representation in senior leadership amplifies the positive impact of R&D intensity on firm performance. Similarly, Joecks et al. (2013) found that companies with female executives invest 20% more in R&D, driving greater product innovation and long-term growth. Gender-diverse TMTs effectively bridge innovative strategies with execution and resource allocation, facilitating the introduction of radical innovations while enhancing the value maximisation of intellectual property portfolios (Díaz-García et al., 2013; Cropley & Cropley, 2017). More recently, several empirical studies have demonstrated that incorporating diverse perspectives in TMTs and fostering collaborative approaches that integrate varied competencies and experiences in senior roles enhance innovation processes (Williams & Habersetzer, 2018; Sarto et al., 2019; Lee & Chung, 2021). Terjesen et al. (2016) suggest that these effects are particularly pronounced in high-tech and knowledge-intensive industries. In this context, firms with substantial patent portfolios benefit from diverse leadership, particularly when women hold significant positions, as their presence has been shown to positively influence innovation and ultimately enhance overall firm performance (Saggese & Sarto, 2019; Manita et al., 2020; Saggese et al., 2021).

This positive effect is expected to be even more pronounced in deep tech companies with strong ties to scientific research and advanced technological innovation (Adiguzel & Sonmez Cakir, 2020). These firms develop radical solutions in artificial intelligence, biotechnology, robotics, quantum physics, and nanotechnology. Rather than merely enhancing existing products and services, deep tech companies introduce disruptive innovations with the potential to transform entire markets and address some of the most pressing global challenges. Sustainability plays a central role in deep tech, as many of these technologies are designed to tackle global issues, particularly climate change and public health, through innovations that promote sustainable development. In this context, diversity in leadership teams is essential for fostering creativity and enabling more comprehensive and innovative decision-making processes. It enhances firms' ability to navigate the complexities of technological and market challenges while facilitating identifying unexplored market opportunities-one of the primary challenges deep tech companies faces. Moreover, gender diversity in TMTs could enable these firms to integrate rigorous scientific approaches with effective commercialisation strategies, leveraging a stronger ethical and social orientation to foster more responsible and inclusive business models. This, in turn, could enhance corporate reputation and attract long-term investors, a crucial factor for deep tech firms that require extended technology maturation periods and substantial funding.

Purpose of the paper. *Despite extensive research highlighting the benefits of gender diversity, significant gaps remain in understanding its impact on firm performance, particularly in industries driven by technological innovation. While existing studies suggest that gender-diverse TMTs contribute to enhanced decision-making, innovation, and overall organisational performance, the interplay between gender diversity, innovation intensity, and firm performance remains*

underexplored. Moreover, to the best of our knowledge, no prior research has examined these relationships within the emerging deep tech sector where scientific advancement, technological disruption, and long-term sustainability challenges make leadership composition particularly crucial.

This study seeks to address this gap by empirically investigating the impact of gender diversity in TMTs on the financial performance of innovative SMEs, specifically focusing on the moderating role of innovation. In particular, it examines whether gender-diverse TMTs enhance the performance of these type of companies and whether this effect is more pronounced in deep tech firms than other industries, given their high research intensity and stronger emphasis on sustainability.

To achieve this, the study tests the following hypotheses:

***H1**: Gender diversity in TMTs has a positive effect on firm performance.*

***H2**: Innovation positively moderates the relationship between gender diversity in TMTs and firm performance.*

***H3**: The moderating effect of innovation on the relationship between gender diversity in TMTs and firm performance is more significant in deep tech firms.*

By empirically validating these hypotheses, this paper aims to offer new theoretical and managerial insights into the role of gender diversity in innovation-intensive contexts. It contributes to the broader debate on corporate governance and organisational performance while providing specific implications for firms operating at the intersection of science, technology, and commercialisation.

Methodology. *Our study conducts a quantitative analysis based on a sample of 2,323 Italian innovative SMEs operating in non-financial sectors, extracted from the AIDA database by Bureau van Dijk (BVD). The choice to focus on Italian innovative SMEs is motivated by several academic and contextual factors.*

First, SMEs play a crucial role in economic development and technological innovation, particularly in European economies, where they represent a significant share of employment and value creation. Unlike large corporations, SMEs often exhibit greater organisational flexibility and a more substantial capacity for rapid innovation, making them an ideal setting to examine the impact of gender diversity in TMTs on firm performance.

Second, Italy has a dynamic and rapidly growing ecosystem of innovative SMEs, particularly in high-tech and deep tech sectors such as artificial intelligence and robotics. This growth is further supported by various national projects financed under the National Recovery and Resilience Plan (PNRR), which aim to foster the development of these technologies and their related ecosystems.

Third, Italy provides a relevant context for studying the role of gender diversity in leadership. Despite advancements in gender equality policies, female representation in executive roles remains relatively low compared to other European countries. Investigating gender diversity within Italian innovative SMEs allows a better understanding of how leadership composition influences performance in a setting where structural barriers to female leadership persist.

We employ an unbalanced panel dataset covering 2015 to 2023, comprising 4,609 observations. To test our first hypothesis (H1), we use the following model:

$$\text{Firm performance} = f\,(\text{Female management, controls})\ [1]$$

The dependent variable, firm performance, is measured using return on assets (ROA), defined as the ratio of EBIT to total assets. ROA is a widely used indicator of firm performance, providing insights into the profitability of a company's core operations. The key explanatory variable in model [1] is Female management, which represents the proportion of women in managerial positions, calculated as the ratio of female managers to the total number of managers in the company. All these data were extracted from the AIDA database.

To examine our second hypothesis (H2), we extend the previous model by incorporating an interaction term to assess the moderating role of innovation:

$$\text{Firm performance} = f\,(\text{Female management, Patent Portfolio Value, Female management} \times \text{Patent Portfolio Value, controls})\ [2]$$

In model [2], we investigate whether innovation influences the relationship between gender diversity in management and firm performance. Specifically, we introduce the interaction term Female management × Patent Portfolio Value to test the moderating effect of innovation, as proposed in H2. The variable Patent Portfolio Value is the ratio of the total value of a firm's patent portfolio (sourced from the Orbis IP database) to total assets (sourced from the AIDA database). This measure captures the firm's investment in intellectual property, indicating its innovation capacity. We include several control variables for innovation, financial structure, and managerial characteristics. To assess a company's commitment to innovation, we use Market Attractiveness and Technical Quality from the Orbis IP database, which capture the competitive landscape and the level of innovation embedded in a firm's intellectual property. Financial capacity is also considered, as it influences a firm's ability to invest in strategic initiatives, including innovation. Leverage, measured as interest-bearing debt relative to total assets, reflects a company's reliance on external financing. Cash Holding, expressed

as the ratio of liquidity to total assets, indicates the availability of internal financial resources. Tangibility, the ratio of tangible assets to total assets, provides insight into the firm's ability to offer collateral. These data were gathered from the AIDA database. To account for structural differences, we control firm size, calculated as the natural logarithm of total assets, and firm age, measured as the natural logarithm of the number of years since the company's foundation plus one. These variables serve as proxies for reputation and operational track record. Additionally, we include year and industry dummies to control for temporal and sector-specific effects.

To test our third hypothesis (H3), we examine whether the moderating effect of innovation on the relationship between gender diversity and firm performance is stronger in deep tech firms. The extended model is formulated as follows:

Firm performance = f (Female management, Patent Portfolio Value, Deep Tech, Female management × Patent Portfolio Value, Female management × Deep Tech, Patent Portfolio Value × Deep Tech, controls) [3]

To define the Deep Tech dummy variable, we use an ad hoc database provided by InfoCamere, which contains extensive descriptive and qualitative information on innovative Italian SMEs. This dataset includes details on each firm's development stage, target markets, technological specialisation, and other business characteristics. Integrating this information into our study required a systematic data matching and consolidation for all 2,323 SMEs in our sample. Deep tech firms were identified using a machine learning approach to process large volumes of structured and unstructured data. The system was trained through iterative processes, refining its accuracy over multiple runs. The classification was based on key factors that define deep tech firms. These include their involvement in advanced technological fields such as artificial intelligence, robotics, biotechnology, and quantum computing, as well as their reliance on proprietary technologies and high research intensity. The model also analysed company descriptions, incorporating deep tech-related keywords to improve classification accuracy. To ensure the reliability of the classifications, we performed sample-based validation tests. This approach allows us to assess whether gender diversity in TMTs and innovation intensity have a more significant impact on firm performance in deep tech companies than other innovative SMEs. By differentiating between innovative SMEs, which develop new products and services across various sectors, and deep tech SMEs, which rely on breakthrough scientific advancements, the study offers a clearer understanding of how leadership diversity impacts firm performance in distinct innovation-driven contexts.

Results. *As this study is still a work in progress, the statistical analyses to thoroughly test the three hypotheses have not yet been completed. However, we can outline the expected results based on existing literature and preliminary insights.*

For the first hypothesis (H1), we anticipate a positive relationship between gender diversity in TMTs and firm performance, suggesting that a higher presence of women in management contributes to better business outcomes. Prior empirical studies have consistently shown that gender-diverse leadership enhances decision-making, fosters innovation, and improves overall organisational effectiveness.

Regarding the second hypothesis (H2), we expect Patent Portfolio Value to moderate the relationship between Female management and firm performance positively. This would indicate that firms with a strong patent portfolio benefit even more from gender-diverse leadership, as innovation-driven environments tend to thrive on diverse perspectives and inclusive decision-making processes. While high patent intensity can introduce financial and strategic challenges, gender-diverse leadership will likely mitigate these issues, leading to stronger firm performance.

The third hypothesis (H3) presents more uncertainty, exploring an area with limited academic attention. While we expect the interaction between Female management and Patent Portfolio Value to be significant in deep tech firms, the magnitude and direction of this effect remain less predictable. Deep tech firms operate under unique conditions that may influence the role of gender diversity differently from that of other innovative SMEs.

These expected results highlight the potential strategic value of gender diversity in leadership, particularly in innovation-intensive firms. The final analysis will validate these relationships empirically, offering new insights into the intersection of gender diversity, innovation, and firm performance.

Research limitations. *This study focuses on Italian innovative SMEs operating within a specific civil law context, which may limit the generalizability of the findings to firms in different institutional and cultural settings. Legal frameworks, corporate governance structures, and cultural attitudes toward gender diversity vary across countries, potentially shaping the relationship between female leadership and firm performance. A cross-country analysis could provide deeper insights into how these institutional differences influence the dynamics examined in this research.*

Another limitation is the reliance on patent portfolio value as a proxy for innovation. While patents represent a significant dimension of technological advancement, they do not capture other forms of innovation, such as process improvements, product development, or business model innovation. Future research could integrate alternative innovation metrics to gain a more comprehensive perspective on how gender diversity interacts with different innovation strategies.

The choice of SMEs as the focus of this study presents both strengths and limitations. SMEs play a critical role in economic development and innovation, particularly in European economies, where they drive employment and technological advancements. However, compared to large corporations, SMEs typically have fewer formalised structures, more constrained financial resources, and a greater dependence on the strategic vision of a small leadership team. These characteristics may amplify or diminish the effects of gender diversity in ways that are not directly comparable to larger

firms. Future research could explore whether similar dynamics hold in larger organisations with more complex governance structures and hierarchical decision-making processes.

Finally, the classification of deep tech firms, while based on a rigorous machine learning approach, may require further refinement. Although the model incorporates multiple criteria to define deep tech firms, additional validation through expert evaluation or alternative classification techniques could enhance its accuracy.

Managerial implications. *If confirmed, this study's findings suggest that gender diversity in leadership strategically enhances firm performance, particularly in innovation-driven environments. A more significant presence of women in TMTs could lead to more inclusive decision-making processes, improved problem-solving, and greater adaptability to market changes. Companies should consider implementing leadership development programs, mentorship initiatives, and targeted recruitment strategies to promote diversity and ensure that women have greater access to senior roles.*

TMTs could benefit from fostering an organisational culture that supports inclusive leadership. The potential positive impact of gender-diverse leadership on innovation suggests that firms investing heavily in research and development and intellectual property development might benefit more from increasing female representation in management. In such contexts, diverse leadership could enhance knowledge integration and facilitate more effective innovation strategies, ultimately improving firm performance.

These considerations are particularly critical for deep tech firms, a rapidly growing and high-risk sector with breakthrough scientific advancements, long development cycles, and high capital intensity. The presence of women in TMTs could enhance the strategic resilience of these firms by improving risk management, fostering more balanced decision-making, and strengthening adaptability in an uncertain business environment. Given that deep tech companies often operate at the intersection of technological innovation and long-term sustainability goals, female leadership may also play a crucial role in ensuring that innovation aligns with broader ethical, social, and environmental considerations. Additionally, women in leadership positions may bring a heightened sensitivity to sustainability-related challenges, reinforcing deep tech firms' ability to develop solutions that address pressing global issues such as climate change, healthcare innovation, and resource efficiency. This aligns with the broader objectives of deep tech firms, which are often designed to create transformative societal impact.

Policymakers and industry stakeholders should also consider how regulatory frameworks could support gender diversity in leadership. If gender diversity enhances firm performance, targeted incentives, corporate governance guidelines, or sustainability-related policies could encourage a more balanced representation of women in decision-making roles. Investors focusing on sustainability and responsible corporate governance may also consider these findings when assessing firm potential, reinforcing the business case for diversity in leadership, particularly in high-tech and deep tech sectors.

Finally, the expected findings are particularly relevant given that SMEs represent most businesses in Italy and Europe and account for the largest share of employment. Promoting gender diversity in SME leadership would enhance firm performance and generate broader socioeconomic benefits, particularly for women in the workforce. Ensuring more excellent female representation in decision-making could foster more equitable career progression opportunities, reducing gender disparities in employment and leadership positions

Originality of the paper. *This study makes a significant contribution to the literature on gender diversity by being the first to examine its impact on firm performance in the context of innovative SMEs while also considering the moderating role of innovation. Existing research has predominantly focused on large corporations, overlooking SMEs, which operate under distinct conditions, such as resource constraints and a greater reliance on strategic agility. By addressing this gap, the study highlights the critical role of leadership composition in sustaining competitive advantage in dynamic, innovation-driven markets.*

Moreover, this research is the first to explore the intersection of gender diversity, innovation, and firm performance within the deep tech sector. Deep tech firms, characterised by their reliance on breakthrough scientific discoveries, long development cycles, and substantial investment horizons, face heightened technological and financial uncertainty. In this context, leadership diversity may be even more crucial in fostering radical innovation, strengthening risk management, and ensuring the successful commercialisation of advanced technologies. Unlike traditional high-tech firms, deep tech enterprises require strategic leadership to navigate complex ecosystems, balance long-term research goals with commercial viability, and drive sustainable innovation.

By addressing a previously unexplored research gap, this study provides a novel perspective on how gender-diverse leadership influences firm outcomes, particularly in sectors that depend on technological advancement and long-term strategic decision-making. It establishes a foundation for future research on gender diversity in technology-intensive industries. It offers new insights into how inclusive leadership structures can enhance innovation capacity, mitigate risks, and support sustainable growth in firms at the forefront of scientific and technological progress.

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No Women No Innovation?
The Effect of Women on Boards on Patent Activity in SMEs

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Abstract

Women directors are often perceived as more risk-averse than men counterparts, potentially compromising firm's innovative performance. Contrasting studies reveal instead an improvement in the decision-making process due to greater diversity on board. Consequently, how is innovation influenced by women representation on boardrooms? Limited empirical research exists on investigating the influence of women on board (WOB) on innovative performance of SMEs. Using a longitudinal dataset of innovative Italian SMEs, our study examines whether innovative SMEs lead by women exhibit any substantial differences in innovative performance compared to male-led innovative SMEs. Our findings potentially reveal significant differences in innovation between the two groups, highlighting the need for more caution in providing general subsidies to spur innovation, by shifting the focus to alternative rewards based on measurable innovative contributions of firms, rather than remaining anchored to general passive tax subsidies to innovation.

Framing of the research. *In recent decades, academics and practitioners have strongly debated the role of women on boards, attracting increasing attention of policy makers. Several countries (e.g., Spain, Italy, Norway, California and many others) have consequently introduced laws to guarantee a more balanced and fair composition of corporate boards (Greene et al., 2020; Smulowitz et al., 2025). Besides social equality consequences, these political interventions also positively influence the value maximization of the firm. Value maximization literature states that more women on boards positively impact firm value through a better decision-making process (Griffin et al., 2021), influencing monitoring and resource provision (Hillman and Dalziel, 2003). Nevertheless, frequently women are placed into board positions due to tokenism (King et al., 2010; Yoder and Sinnet, 1985; Kanter, 1977), without actually having an impact on firm's management, or they are welcomed on board during crisis periods and high-risk situations, commonly called "glass cliff" situation (Ryan and Haslam, 2007, 2005). Additionally, female board members often perceive a lower status, and they are less valued as a group member (Vial et al., 2016; Duguid et al., 2012).*

An important strand of literature investigates the influence of women board membership on innovation outputs, but there is no common agreement on whether this influence is positive or negative (Smulowitz et al., 2025). Some studies state that women are more risk-averse negatively influencing the level of innovation in the firm (e.g., Nelson, 2015; Faccio et al., 2016). Empirical research has shown that on average women choose options with fewer financial risks than male counterparts (Sapienza et al., 2009; Byrnes et al., 1999; Jianakoplos and Bernasek, 1998). Additionally, women often see their position as more precarious than the one of their male counterparts, amplifying their risk-averse approach (Glass and Cook, 2020; Smith et al., 2019; Vial et al., 2016; Smulowitz et al., 2025) Other works provide opposite results mainly focusing on the improvement of decision-making process given by the gender diversity on the board that results in more innovation (Smulowitz and Smulowitz, 2024; Hemmert et al., 2022; Griffin et al., 2021; Vafaei et al., 2021; Cumming et al., 2015; Adams and Ferreira, 2009). Heterogeneity in boards spurs broader perspectives which allow the management to be involved in in-depth conversations and find various alternatives (Rao and Tilt, 2015; Van Knippenberg et al., 2004; Watson et al., 1998; Robinson and Dechant, 1997).

Smulowitz et al. (2025) investigate this controversial situation by shedding light on big firms. Specifically, they empirically demonstrate that women on board can be both more risk averse, but also more innovative, depending on the firms' performance relative to aspirations (PRA) (Chen and Miller, 2007; Eggers and Suh, 2019; Greve, 2003). This research seems to overcome the debate on the impact of women on board on innovation of big firms, however, are those results valid also for SMEs? A recent study from Teruel and Segarra-Blasco (2017) confirms that the size of the firm exerts a moderating role between gender diversity in boardrooms and innovation, highlighting a greater difficulty for SMEs in capturing advantages from gender diversity during the innovation process, compared to large firms. However,

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no studies specifically focus on small and medium enterprises to understand the impact of women on board on innovation. We aim to investigate the impact of women on board on innovation in SMEs, contributing to filling the gap in the literature.

To address this gap, we will focus on the Italian context as Italy is characterized by a widespread SMEs ecosystem. Specifically, about 80% of the workforce is employed in small and medium enterprises (Cucino et al., 2024; ISTAT, 2023). Additionally, the Italian Ministry of Development (MISE, 2020) significantly focuses on firms transitioning towards Industry 4.0, initiating various interventions to spur digitalization and innovation among firms. Consequently, Italy is a strong empirical setting to validate our hypotheses and provide significant contributions to the literature (Martinelli et al., 2021).

Purpose of the paper. *The present work aims to investigate the impact of women board membership on innovative performance of small and medium enterprises (SMEs). While past research has focused on the role of women on corporate boards in large firms, in relation to firm innovation, there remains a gap in understanding how these dynamics works for SMEs. Existing literature presents conflicting perspectives, where some works argue that women's risk aversion hinders innovation, while others highlight their contribution to enhance decision-making processes that foster innovation. A recent study from Smulowitz et al. (2025) suggest that the relationship between women on board and innovation relates to firms' performance relative to aspirations (PRA), solving the debate for large firms. This study aims to extend the empirical investigation by exploring whether similar effects hold for SMEs, contributing to the broader understanding of gender diversity's role in corporate governance and innovation within smaller enterprises.*

Methodology. *We build a unique dataset collecting information from the Italian Chamber of Commerce database, Aida-BvD database, and Orbis IP. The Italian Chamber of Commerce database is a national institution responsible for validating all companies' administrative and legal requirements. The law requires that all innovative SMEs must register in a specific section of the Italian Chamber of Commerce's register and provide information regarding board composition. From this dataset, we obtain about 3,000 innovative SMEs in Italy founded between the 2013 and the 2023. Among this, 2190 have a majority of women in their boards. Moreover, to collect financial information, since the Italian Chamber of Commerce does not provide this kind of information, we employ the Aida database provided by Bureau van Dijk (BvD). By merging data from both sources, we collect comprehensive financial information on 1,937 innovative SMEs. Finally, we collect patent data employing Orbis IP. As such, we are able to conduct our empirical analysis on a comprehensive sample of 1,937 SMEs consisting of non-financial information (such as board composition information, location, industry, and so on), financial information (like revenues, profitability measures, etc.), patent information (regarding quantity, scope, citations, IPS and CPC).*

We will test our hypotheses by employing a difference in difference approach followed by a propensity score matching method. The difference in difference (Diff-in-Diff) is a widely spread methodology (Zambelli et al., 2024; Potì and Wang, 2023; Becalli et al., 2023; Srivastav and Vallascas, 2022) adopted to compare a treated group and a control group. Specifically, the Diff-in-Diff methodology estimates the effect of a specific treatment by comparing the changes in outcomes over time between the two groups of treated and control observations (Zambelli et al., 2024). Both groups will be evaluated before and after the treatment. We aim to compare the treated group of innovative SMEs with the majority of board components represented by women, and the control group of innovative SMEs with the majority of man in the board. Our treatment effect is, indeed, represented by having a majority of women on board, while our outcome is the number of patents the firm has licensed. Moreover, consistently with past literature, our model will include control variables, described as follows: (1) whether the SME operates in a high-tech industry or not (Messeni Petruzzelli et al., 2022), (2) the SME's age (Kelly & Amburgey, 1991), (3) the SME's size (Arbore & Ordanini, 2006; Horváth & Szabó, 2019), (4) the SME's potential and realized absorptive capacity (i.e., the R&D expenses on total revenue (Cassetta et al., 2020; Zahra & George, 2002), and (5) the digital skills of the SME's human resources (measured as the percentage of employees with a STEM degree (Agostini & Filippini, 2019; Eller et al., 2020; Giotopoulos et al., 2017; Horváth & Szabó, 2019). We will extend our model by employing a propensity score matching (PSM) methodology (in line with Zambelli et al., 2024; Ayadi et al., 2021; Casu et al., 2013; Caliendo and Kopeining, 2008). The PSM is a statistical methodology commonly used to estimate causal treatment effects in non-randomized environments. To perform this method, we will identify the treatment, which is to have the majority of board components represented by women, a group of treated observations, and a control group (Casu et al., 2013; Rosenbaum and Rubin, 1983). Applying this research strategy we will be able to rigorously identifying the impact of women on board on innovation of SMEs, significantly contributing to the literature.

Results. *The study will potentially reveal key insights into the relationship between women board representation and innovation in SMEs, measured by the number of patents licensed. Based on prior literature and theoretical perspectives, several possible outcomes may emerge. However, we expect that the presence of women on board in SMEs positively impact innovation processes, enhancing decision-making quality, resource allocation, and strategic vision. This would be reflected in a greater number of licensed patents, particularly in firms operating in high-tech industries, where diverse perspectives may drive creativity and problem-solving. Another possible result is that female board representation does not significantly influence innovation in SMEs (e.g., Audretsch et al., 2022), suggesting that other factors, such as firm size, industry, and absorptive capacity (Zahra and George, 2002), play a more dominant role in driving patenting activity. We could also expect a negative relationship between women on board and innovation, demonstrating that Smulowitz et al. (2025) results do not hold for SMEs, and reopening the debate and providing interesting insights for deepening the field.*

Research limitations. *Despite its strong contributions to the academic field, the present study could present some limitations. First, the study focuses exclusively on the Italian innovative SMEs, which may limit the applicability of findings to other countries with different regulatory environments, cultural attitudes toward gender diversity, and innovation ecosystems. Future research could explore similar dynamics in other contexts to validate the results. Second, the study uses a dummy variable to indicate whether the majority of board members are woman, but this not accurately capture the actual influence of female directors. On the same vein, patents are a widely used measure of innovation (Block et al., 2025; Nagaoka et al., 2010; Encaoua et al., 2006), but they may not fully capture all forms of innovative activity, like non-patentable technological advancements. Future research could incorporate additional measures of female influence and innovation.*

Managerial implications. *This study has several important implications for managers and entrepreneurs seeking to foster innovation and improve corporate governance in SMEs. If the study finds a positive relationship between women on board and innovation, SMEs managers or entrepreneurs should start actively promoting gender diversity in board composition, leading to more balanced decision-making and enhanced vision and culture of innovation. If, on the contrary, the impact on innovation is negative due to the higher level of risk aversion, managers should moderate risk exposure of the firm mitigating this effect.*

Originality of the paper. *This research contributes to the literature by addressing a significant gap in the field, investigating the impact of women board representation on innovation within small and medium enterprises. While previous studies have extensively addressed this relationship in large corporations, limited attention has been given to SMEs. However, SMEs play a crucial role in economic growth and technological advancements, especially in Europe. For example, Italy counts a significant presence of small and medium enterprises, which employ about 80% of the national workforce (ISTAT, 2023). This empirical reality supports the importance of our findings for the entrepreneurial ecosystem. Additionally, by integrating data from the Italian chamber of commerce, Aida-BvD, and Orbis IP, this study constructs a unique dataset that combines board compositions, financial information, and patent data. This allows for a more rigorous analysis of the relationship between women on board and innovation in SMEs.*

Key words: *Women on Board; Gender; Patent; Innovation*

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“E-Sports and social innovation: promoting resilience, inclusion, and social capital in the digital age”

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Abstract

This study investigates the potential of E-Sports as instruments for social innovation, emphasizing their capacity to foster personal resilience, social inclusion, and the development of social capital within digital communities. Sports, by their very nature, are innovative, as they continuously adapt, evolve, and transform in response to social, political, and technological shifts (Ratten & Ferreira, 2016). In an era marked by rapid digitalization and the transformation of social dynamics, E-Sports have emerged not only as a global entertainment phenomenon but also as an ecosystem that offers educational, professional, and personal growth opportunities. Their accessibility and global reach make them particularly effective in engaging populations that are often excluded from traditional sports or social participation.

This paper explores the role of E-Sports in promoting digital resilience, defined as the ability to confront challenges and adapt to competitive and ever-changing environments. It also examines how E-Sports foster social inclusion by breaking down geographical, economic, and cultural barriers, enabling interaction among individuals from diverse social backgrounds and genders. Furthermore, the study highlights the contribution of E-Sports to building social capital through the creation of supportive and collaborative networks within digital communities.

A critical consideration in the E-Sports sector is the concept of responsible innovation. While digitalization offers numerous opportunities, it also introduces risks such as gaming addiction, mental health issues, privacy violations, and discrimination. Responsible innovation is essential to addressing these challenges and ensuring that E-Sports can grow in a sustainable and positive manner, benefiting both individuals and society at large.

By leveraging the unique characteristics of E-Sports, this research aims to demonstrate how they can serve as powerful tools for social innovation, promoting resilience, inclusion, and community building in the digital age.

Research Framework. *In the context of increasing digitalization, E-Sports have emerged as a global phenomenon that not only redefines digital entertainment but also plays a significant role in shaping new social dynamics. E-Sports, or electronic sports, refer to competitive video gaming (Jenny et al., 2017) and have gained immense popularity worldwide. Some argue that the term E-Sports specifically denotes a high level of competitive gaming, characterized by professional players and elite tournaments that demand substantial time, dedication, training, and coaching. Many scholars (e.g., Funk, Pizzo, & Baker, 2018; Jenny et al., 2017; Jonasson & Thiborg, 2010; Thiel & John, 2019; Witkowski, 2012) agree that E-Sports share enough similarities with traditional sports to be considered “real sports.” However, others contend that E-Sports do not fit the conventional definitions of sports (Drewe, 2003; Hallmann & Giel, 2018; Parry, 2019). Heere (2018) argues that regardless of their classification, E-Sports should be studied by sports scholars because they represent a recreational activity that is increasingly adopting the characteristics of modern organized sports.*

Historically, the Olympic Movement has been hesitant to embrace E-Sports, as their structures, culture, and certain game titles were not aligned with the value-based ethics of the Olympics. However, the International Olympic Committee has found a way to engage with E-Sports through sports simulation games that incorporate a physical dimension, aligning with its values and strategic priorities (Abanazir, 2022). Within globally connected E-Sports platforms, the sense of community and belonging remains central to the values and principles guiding the creation of online spaces (Hayday et al., 2021). E-Sports offer numerous opportunities to promote developmental outcomes and support inclusivity goals (Hayday & Collison, 2020; Hayday et al., 2022; Martoncik, 2015; Trepte et al., 2012). Their ability to bring individuals and communities together presents unique opportunities for social innovation. Platforms like Twitch and YouTube Gaming create virtual spaces where players can interact and socialize, overcoming geographical and cultural barriers. This social dimension of E-Sports contributes to the development of digital skills and fosters social inclusion.

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Critics of E-Sports often highlight the lack of physical activity, arguing that they are not as healthy as traditional sports. While it is true that most E-Sports do not involve physical exertion, engaging in E-Sports can still offer significant health benefits, particularly in terms of social and mental well-being. Playing online with peers opens up new possibilities for digital friendships and communities. In other words, gaming and E-Sports provide many young people with a sense of belonging and acceptance among like-minded peers, which is crucial for ensuring a high quality of life. This aspect of E-Sports underscores their potential to contribute positively to the social and mental health of participants, even in the absence of physical activity.

Objective of the Paper. *The aim of this paper is to explore how E-Sports can serve as tools for social innovation, promoting resilience, inclusion, and social capital, thereby contributing to digital and social well-being. This analysis is structured around three key dimensions:*

1. *Digital resilience and adaptability: participation in E-Sports can foster the development of coping strategies, adaptability, and stress management in competitive environments. By engaging in E-Sports, individuals enhance their digital skills and psychological well-being, as they navigate challenges and build resilience. Well-being, a sense of belonging, social integration, and happiness are critical components of an individual's overall health. While the relationship between E-Sports, well-being, and mental health remains underexplored, some international studies suggest that playing E-Sports can offer mental health benefits, such as stress relief and the formation of digital friendships and virtual communities (Martoncik, 2015). Beyond physical activity, many of the health-related arguments that justify financial support for traditional sports also apply to E-Sports. For example, E-Sports can promote social inclusion in ways like traditional sports, providing young people with opportunities for connection and personal growth.*
2. *Social inclusion and digital accessibility: E-Sports offer inclusive platforms for traditionally marginalized groups, enabling equitable access to educational, professional, and social opportunities in the digital realm. For instance, in Italy, the Paralympic Committee has partnered with E-Sports to develop virtual sports as tools for inclusion and social integration. However, challenges related to gender representation persist. Gender inequality, equity, and empowerment have long been central issues, as highlighted by Saavedra (2009, p. 124): "Gender emerges at the intersection between the physical and the social, and it is precisely here that sport also resides." Addressing gender inequalities requires a focus on both the physical and social dimensions of participation. In terms of gender equality, E-Sports have already begun to support initiatives aimed at closing the gender gap. For example, in 2019, Riot Games collaborated with Girls Who Code, an international nonprofit organization dedicated to empowering women in technology and E-Sports (Huyer & Sikoska, 2003; Riot Games, 2022).*
3. *Social capital and community building: E-Sports facilitate the formation of social networks based on trust, collaboration, and mutual support. These networks contribute to the creation of inclusive and resilient communities, strengthening social capital and cohesion. The global nature of E-Sports allows players to form bonds that transcend geographical barriers, fostering a sense of global community. Platforms like Discord, co-founded by Jason Citron, have been instrumental in connecting players worldwide, creating spaces for mutual support and cultural exchange. Organizations such as the Global E-Sports Federation work to promote the sustainable development of E-Sports, building networks that reinforce social capital on an international scale. Additionally, E-Sports platforms have advanced opportunities for people with disabilities (Special Effect, 2023), as cognitive ability often plays a more significant role than physical ability in many gaming titles. This focus on accessibility allows E-Sports to engage a broader audience, including sports enthusiasts, non-traditional sports communities, and hard-to-reach populations.*

While certain features in gaming, such as player IDs, voice communication, and in-game chat, can still lead to instances of discrimination, the digital nature of E-Sports offers players a degree of relief from the real-world stigmas they might face in physical settings. These stigmas, often deeply ingrained in society, are less pronounced in online spaces, where inherent markers of gender, age, religion, or language are not immediately visible. As a result, digital platforms can provide a more inclusive environment compared to the physical world, where such characteristics frequently lead to exclusion and discrimination.

Traditional sports often face limitations due to their physical nature, which can prevent diverse groups-such as men and women, young and old, or disabled and non-disabled individuals-from competing together. In contrast, E-Sports are inherently gender-neutral, as they rely less on physical ability and more on cognitive and strategic skills. This reduced physical component means that participation in E-Sports has the potential to transcend traditional gender stereotypes and disparities (Kim, 2017). In theory, this could allow for true gender equality in competitions, where individuals of all genders could compete on the same team, moving beyond the traditional male vs. male or female vs. female formats. However, real-world gender stigmas have influenced the adoption and diversity of participation in E-Sports (Ruvalcaba et al., 2018; Taylor, 2017), leading to a significant lack of female representation at both grassroots and competitive levels (Hilbert, 2019).

Despite these challenges, the E-Sports industry is making strides toward greater inclusivity. Efforts to boost female participation are gaining momentum, with initiatives aimed at improving diversity and empowering women to address the hypermasculinity often prevalent in the industry (Associated Press, 2019; Riot Games, 2022; Women in Games, 2022). The dynamic and evolving nature of E-Sports presents a unique opportunity to foster inclusivity and support development programs that encourage broader participation. By addressing existing barriers and providing targeted support for female players, the industry can work toward a future where gender equality is fully realized, not only in E-Sports but also in traditional sports.

In summary, while E-Sports still face challenges related to discrimination and gender representation, their digital nature offers a unique platform for fostering inclusivity. By leveraging this potential and implementing initiatives to support diversity, the E-Sports industry can pave the way for a more equitable future in both digital and traditional sports.

Methodology. *The methodological approach of this study employs a multi-faceted strategy to ensure a comprehensive understanding of E-Sports as tools for social innovation. This approach includes:*

1. *Literature review: the first phase aimed at establishing the theoretical foundation of the study. Sources include academic journals, policy reports, and grey literature focusing on the themes of social innovation, inclusion, and e-sports. This review enables the identification of key concepts and frameworks, guiding the empirical stages that follow.*
2. *Case Study analysis: the second phase involves a qualitative case study drawn from the ongoing project "E-Well: E-sports between resilience, inclusion, and social capital." The selected case focuses on a grassroots e-sports initiative that actively promotes inclusive values. Data for the case study are collected through direct observation of events and analysis of project documentation. This component aims to provide in-depth insights into how inclusive strategies are operationalized within real-world e-sports settings.*
3. *Structured questionnaires: the third phase incorporates a quantitative approach through the deployment of a structured questionnaire to various professionals within the E-Sports sector, including athletes, coaches, and mental coaches. The questionnaire is designed to gather data on:*
   - *Health status: with a focus on both physical and mental well-being, this section aims to assess the health impacts of participating in or working within the E-Sports industry.*
   - *Resilience: a dedicated section explores the strategies employed by professionals to cope with the challenges and pressures associated with competitive gaming. This includes stress management techniques, adaptability, and coping mechanisms.*
   - *E-Sports consumption: this section investigates participants' habits and engagement with E-Sports competitions, including their frequency of participation, viewing habits, and overall involvement in the E-Sports ecosystem.*

   This phase supports the generalizability of findings and allows for cross-sectional analysis.

By combining these methods, the study employs methodological triangulation, integrating both qualitative and quantitative data to provide a robust and nuanced analysis. The literature review informs the construction of the case study and the survey; the case study offers contextual depth; and the survey provides measurable insights. Together, they align with the research objectives and ensure a coherent and focused methodological approach. This approach ensures a holistic understanding of the role of E-Sports in promoting social innovation, resilience, inclusion, and social capital, while also addressing the health and well-being of those involved in the industry. The triangulation of data sources enhances the reliability and validity of the findings, offering a comprehensive perspective on the potential of E-Sports as a force for positive social change.

Expected Results. *We expect the results to show that e-sports initiatives designed with inclusive objectives-such as gender diversity, accessibility for people with disabilities, and engagement of socially disadvantaged groups-lead to measurable social innovation outcomes. Specifically, the questionnaire survey is anticipated to reveal:*

- *A statistically significant increase in participants' sense of social inclusion and digital competence.*
- *Positive correlations between inclusive event design (e.g., diversity policies, inclusive communication, team support structures) and reported improvements in community belonging.*
- *Increased levels of perceived self-efficacy, particularly among participants from marginalized groups.*

From the case study, we expect to identify:

- *Organizational practices that facilitate inclusive participation, such as mentorship programs, accessible technologies, and non-competitive formats.*
- *Narratives and testimonials that demonstrate empowerment, social engagement, and perceived resilience as direct outcomes of participation.*

These results will contribute to a deeper understanding of how E-Sports can promote digital and social well-being, offering insights into their potential as platforms for positive social change.

Research Limitations. *While this study aims to provide valuable insights, it is important to acknowledge its limitations:*

1. *Availability of empirical data: the research may be constrained by the limited availability of empirical data on E-Sports and their social impact. Much of the existing literature is still emerging, and there may be gaps in data related to specific demographics or regions.*
2. *Need for longitudinal studies: the long-term impact of E-Sports on social innovation, resilience, and inclusion is not yet fully understood. Longitudinal studies are needed to assess how these effects evolve over time and to determine the sustainability of E-Sports as tools for social change.*
3. *Rapid evolution of the sector: the E-Sports industry is evolving at a rapid pace, with new technologies, platforms, and trends emerging frequently. This dynamic nature may require frequent updates to the collected information and could limit the generalizability of the findings over time.*

Additionally, it is important to note that this study is a work-in-progress. At the time of writing, the results of the questionnaire administered as part of this research are not yet available. These results, which will provide further empirical evidence and refine the conclusions drawn in this paper, are expected to be presented during the conference where this study will be discussed.

By acknowledging these limitations, the research aims to provide a balanced perspective on the potential of E-Sports while encouraging further exploration and study in this rapidly growing field.

Managerial Implications

From a theoretical perspective, this study extends existing frameworks in social innovation and sport management by exploring the under-researched intersection between digital competition and inclusive value creation. It contributes to the literature on social innovation by positioning e-sports not merely as entertainment or economic drivers, but as potential instruments for generating social capital and enhancing community resilience. The research also expands theories of inclusive innovation by demonstrating how non-traditional sporting environments - such as virtual competitions - can activate participatory processes and empower marginalized groups. Moreover, it informs sport governance theory by highlighting the need for adaptive regulatory models that embrace digital formats and promote equity within emerging competitive domains.

Managerially, the study identifies concrete pathways through which organizations can harness the social potential of e-sports to advance inclusion and sustainability goals. In particular:

1. *Promoting social awareness campaigns: E-sports events and streaming platforms can be integrated into communication strategies to raise awareness on issues such as diversity, equity, and mental health. Organizations can co-create content with players and influencers to reach broad, engaged audiences.*
2. *Designing inclusive virtual environments: NGOs, public institutions, and civic groups can collaborate with game developers and tournament organizers to ensure that virtual spaces are safe, accessible, and intentionally inclusive. These environments offer opportunities for participation and socialization for young people and marginalized communities.*
3. *Strategic branding and marketing: E-sports present a valuable context for companies seeking to build a progressive brand identity. Sponsorships, partnerships, and the development of branded experiences in the gaming ecosystem allow firms to engage a digitally native demographic while reinforcing their commitment to social values.*
4. *Employee development and internal innovation: internally, e-sports can serve as innovative tools for training and team building. Gaming-based interventions can enhance soft skills such as strategic thinking, collaboration, and stress management, fostering more cohesive and adaptive work environments.*
5. *Business model innovation: by embedding e-sports within broader corporate social responsibility (CSR) and sustainability strategies, organizations can reconfigure their value propositions. This approach not only improves social impact but also strengthens stakeholder engagement and supports long-term resilience in fast-evolving markets.*

The adoption of eSports-related strategies not only enables organizations to maximize their social impact but also to innovate their business models, contributing to the creation of a more sustainable and inclusive digital ecosystem. The study contributes to both academic discourse and managerial practice by framing e-sports as dynamic arenas for social experimentation and inclusive transformation. It encourages researchers and practitioners alike to reimagine digital competition as a meaningful space for innovation with tangible societal benefits.

Originality of the Paper. *This study offers an innovative perspective on eSports, considering their potential as tools for social innovation rather than mere forms of entertainment. By recognizing and leveraging this potential, it is possible to harness eSports to promote a more inclusive and socially responsible digital future.*

Keywords: *E-Sports, Social Innovation, Responsible Innovation, Resilience, Gender Diversity, Social Inclusion, Social Capital, Digital Well-being, Social Sustainability.*

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The ACT Model: A Literature Review on the Role of Influencer Marketing in Digital Environments with a Focus on Food and Beverage

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Abstract

This research examines the role of influencer marketing in the digital environment, focusing on the food and beverage sector through a literature review. Specifically, the authors introduce the ACT framework (Attractive, Connection, Trend), a theoretical model that explains how human and virtual influencers attract consumers by creating emotional connections and, consequently, generating new consumption trends. In particular, articles focusing on the role of influencer marketing in digital environments, with a specific emphasis on the food and beverage sector, were identified, selected, and included via Scopus and Scholar, following the PRISMA approach. Results identified three main research areas, related to: Attraction, Connection, and Trend. Overall, results reveal that while users tend to perceive virtual influencers similarly to human ones, awareness of their artificial nature can create a sense of detachment from reality, finally impacting consumer behavior. This study, through the ACT model, provides preliminary analysis of the role of influencer marketing in digital environments, with a focus on the food and beverage sector. Furthermore, it offers valuable insights for both academic research and digital marketing strategies in the food and beverage industry.

Research framework and purpose. *Social media has become a main communication modality in the 21st century, enabling individuals to express our belief, ideas and manner in an absolute new way. This modality have also a huge impact on companies, which have realized that without a correct plan and social media strategy they have no chance to stand out in the rapidly changing digital environment. This change made companies and marketing experts increasingly attentive to the value of advertising and the opportunity to exert influence on multiple platforms (Juska., 2022). Influencer marketing is defined as a new form of marketing that consists of activities aimed at identifying and building relationships with subjects with a strong influence on their following (Wong, 2014). According to Gammoudi et al. (2022, p. 144), "an influencer is someone who entices an influence to do the same action, make the same decision, or change their behavior".*

Therefore, influencers are particular users who, by virtue of their recognized expertise and massive visibility, are able to amplify messages and opinions by influencing other users (Gomez, 2019). This ability is a direct consequence of the reputation that these subjects have built and which pushes the audience to place trust in them (Heyymann, 2011). In light of the reliability and credibility they benefit from, influencers represent a relevant of communication channel between companies and users. Wong (2023) states that "social media have radically changed the balance of power between consumers and brands, because they allow recommendations from customers, playing a fundamental role in maturing the purchase decision."

Virtual Influencers, like avatars, are digital characters, completely computer-generated, created to interact with the public on social media. Indeed, they are managed by experts and digital agencies that help brands to reach desirable target groups effectively through their digital personalities (Audrezet & Koles, 2023). The term influencer marketing was coined by Brown and Hayes (2008, p. 12) to depict "an interaction-driven marketing tactic that uses the influencers' (e.g., key opinion leaders, celebrities and vloggers) characteristics (e.g. personality) to create eye-catching content, drawing their followers' attention and engagement, shaping their purchasing decisions" (Deng et al., 2021, p. 685). With millions of internet users browsing social media platforms for entertainment, inspiration, and product recommendations daily, it is no surprise that marketers are harnessing the power of social media's most recognizable faces for promotion (Rathod et al., 2023).

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Importantly, the credibility of virtual influencers and the parasocial connections they may generate can play a crucial role in the perception of brands (Melnychuk et al., 2023). The effectiveness of their advertising campaigns is closely linked to their ability to appear credible and human. However, significant challenges arise regarding the perception of authenticity of these influencers, which deserve special attention (Ma & Li, 2024). In this context, empathy becomes a key factor in interacting with digital avatars, compared to traditional influencers (Kim & Park, 2024).

In the ever-evolving marketing landscape, innovative strategies for leveraging virtual avatars in promotional campaigns are beginning to take shape. It's crucial to determine which virtual influencers wield the most impact in digital marketing and how they stack up against their human counterparts in terms of brand strategy and control (Audrezet and Koles, 2023). Additionally, the emergence of regulatory challenges surrounding virtual influencers is becoming an increasingly important topic (Sands et al., 2022). It is worth to notice that young consumers often assess human influencers through the lenses of credibility, authenticity, and engagement (Tsen and Cheng, 2021). This highlights the vital role of empathy in fostering deeper connections with real influencers compared to virtual ones (Mirowska and Arsenyan, 2023).

Interestingly, human influencers frequently perpetuate gender stereotypes, and audience perceptions can vary dramatically based on these portrayals (Lee and Yuan, 2023). Therefore, it is essential to devise effective strategies for identifying the most fitting human influencers in the realm of digital marketing (Gammoudi et al., 2022).

A thorough comparison between human and virtual influencers is necessary to determine which figure offers greater advantages for brands. Moreover, incorporating personal narratives and compelling visual content can significantly enhance community engagement. Ultimately, a well-defined online identity plays a key role in boosting audience interaction (Nash, 2023).

Influencer marketing represents an increasingly widespread and effective promotion strategy also in the restaurant sector and for all those who deal with food. This form of marketing offers an opportunity to improve a business and reach a large and "hungry" audience for culinary content. One of the main advantages of influencer marketing for restaurateurs, for example, is the possibility of expanding the visibility of their restaurant or product brand. In practice, influencers with a large following can promote a restaurant or a product through creative and engaging content. Their photos, videos or reviews can attract the attention of a large audience of potential customers, who could be inspired to visit the restaurant.

In order to better understand the possible effectiveness of influencers (virtual and human) in digital marketing, we propose a classification of the literature into three main research areas: Attractiveness, Connection, Trend. The study organizes and synthesizes some of the existing knowledge on influencer marketing in digital environments, with a specific focus on the food and beverage sector. Through a literature review, we adopt a two-pronged approach: a) we identify the main research themes and dynamics that characterize digital influencing in the sector, distinguishing between human and virtual influencers, and b) we develop the ACT Model, a framework that structures the literature into three key dimensions: Attractive, Connection and Trend. This model provides an innovative key to understanding how both types of influencers attract audiences, stimulate engagement and spread new trends in consumer behavior. Furthermore, the review includes some comparative studies analyzing the differences between human and virtual influencers, in an attempt to offer a more comprehensive view of the phenomenon. The ACT Model tries to contribute to summarize existing research but also provides a useful theoretical basis for future studies, providing practical insights for companies and digital marketing professionals in the food & beverage sector.

Methodology. *For this study, a literature review was carried on the basis of the PRISMA methodological approach (Moher et al., 2015), which allowed for a critical analysis of the literature following a structured process divided into four stages: identification, screening, eligibility and inclusion.*

Identification. Via Scopus and Scholar two of the most important academic databases for bibliographic research (Paschou et al., 2020), we identified studies consistent with our research goals. A sample list of selected keywords included terms such as "influencers" and "digital marketing" combined with keywords related to application domains, such as "virtual environmental", "food", and "beverage". After defining the final set of keywords, we conducted a series of queries by combining the selected terms based on database-mining criteria, aiming to extract the most relevant articles for a comprehensive state-of-the-art analysis. An example of a query used was: Title-Abs (("influencers" and "digital environmental) and ("influencer marketing" or "food" or "beverage")) and pubyear > "2020" and <"2024" and (limit-to (doctype, "ar") or limit-to (doctype, "cp")) and (limit-to (language, "English")))

Screening. A data cleaning analysis was carried out, discarding all articles and journals that did not meet some criteria, e.g. non-peer-reviewed journals or with a low impact factor. We selected 18 manuscripts, published between 2020 and 2024, excluding one because it was not available. The selected timeline was chosen to ensure the relevance and actuality of the results, as 2020 represents a key year for the development of influencer marketing (Lou et al., 2020). In fact, partly due to the COVID-19 pandemic, the market value of influencer marketing grew from $1.7 billion in 2016 to $9.7 billion in 2020.

Eligibility and Inclusion. The abstracts of the articles were examined to select those relevant to the topic of the influencers (virtual and human) in digital environments, with a focus on the food & beverage sector. For each selected article, we drafted summary sheets that defined and summarized: objective of the study, methodology, main findings, key theoretical constructs. This approach made it possible to structure and classify the literature, thus facilitating comparison between studies and offering a clear view of the state of art.

We applied thematic coding to organize the selected articles within the ACT framework (Attraction, Connection, and Trend). The coding was initially carried out by one researcher following well-defined criteria, with subsequent collaborative reviews involving co-authors to ensure the overall consistency and clarity of the classification.

Results. *The analysis of the paper led to the creation of a research framework, that is the "ACT model", which offers a classification of the existing literature on influencer marketing in the virtual environment, with a specific focus on the food and beverage industry. Firstly, we underlined the distinction between human and virtual influencers, then we distinguished and organized the literature into three key thematic areas, reflecting a dynamic and interconnected process: 1. Attraction, 2. Connection, 3. Trend (see Table 1).*

Table 1. The ACT model (a summary of the analyzed literature)

Virtual influencers	*Human influencers*
Attraction	
• *Melnychuk et al., 2023 - The role of credibility of the virtual influencers and parasocial connections.* • *Ma & Li, 2024 - Humanization of virtual influencers and its impact on brand perception.* • *Kim & Park, 2024 - The advertising effectiveness of virtual influencers depends on their credibility and humanization.* • *Sands et al., 2022 - Challenges related to the perceived authenticity of virtual influencers.* *Mirowska & Arsenyan, 2023 - The role of empathy in interactions with virtual versus human influencers.*	• *Tsen & Cheng, 2021 - Young consumers evaluate human influencers based on credibility, authenticity, and interaction.* • *Mirowska & Arsenyan, 2023 - The role of empathy in engagement with human versus virtual influencers.* • *Lee & Yuan, 2023 - Human influencers replicate gender stereotypes, and audience perception varies based on these representations.*
Connection	
• *Gammoudi et al., 2022 - Identifying the most effective virtual influencers in digital marketing.* • *Audrezet & Koles, 2023 - Comparison between virtual and human influencers in terms of brand strategy and control.* • *Sands et al., 2022 - Regulatory challenges and the governance of virtual influencers.*	• *Gammoudi et al., 2022 - Strategies for identifying the most effective human influencers in digital marketing.* • *Audrezet & Koles, 2023 - Comparison between human and virtual influencers to determine which is more effective for the brand.* • *Suh, 2020 - Personal narratives and visual content enhance community engagement.* • *Nash, 2023 - A strong IT identity leads to greater audience engagement.*
Trend	
• *Allal-Cherif et al., 2024 - Virtual influencers are perceived as authentic, which increases engagement with their target audience.* • *Kim & Park, 2023 - The attractiveness of virtual influencers can influence imitation desire and purchase intention.* • *Yang et al., 2023 - The influence of virtual influencers in corporate social responsibility (CSR) campaigns.* *Ham et al., 2024 - The role of the positive emotions expressed by virtual influencers*	• *Deng et al., 2022 - Human influencers in the food & beverage sector influence consumer behavior based on audience segmentation.* • *Sokolova et al., 2024 - Human influencers in the food sector promote home cooking and healthier eating habits.* • *Yildirim, 2024 - Green women influencers shape sustainable consumption choices through storytelling and authenticity.*

<u>Attraction</u>. The importance of credibility and humanization of virtual influencers plays a crucial role in how consumers perceive brands (Ma & Li, 2024) and are attracted by them. The effectiveness of advertising based on influencers may depend on the authenticity and ability of such influencers to create an emotional connection with the audience (Kim & Park, 2024). However, some challenges also arise regarding the perception of authenticity of virtual influencers (Sands et al, 2022). Indeed, it is crucial to consider how empathy affects online interactions especially when compared to those with human influencers (Mirowska & Arsenyan, 2023). Moreover, young consumers are more likely to evaluate human influencers based on criteria such as credibility, authenticity and level of interaction (Tsen & Cheng, 2021). It is also interesting to note that human influencers tend to reproduce certain gender stereotypes and the public's perception of them may change in relation to these representations (Lee & Yuan, 2023). Finally, empathy certainly plays a fundamental role in terms of engagement, with both human and virtual influencers (Mirowska & Arsenyan, 2023).

<u>Connection</u>. The literature emphasizes the relevance of connecting with the online audience by identifying the most effective virtual influencers in the digital marketing landscape (Gammoudi et al., 2022). Importantly, however, current studies consider the comparison between virtual and human influencers, especially in relation to brand strategies and control (Audrezet & Koles, 2023). Interestingly, some findings show that personal stories and well-curated visual content can increase community engagement (Suh, 2020) and that a strong digital identity contributes to greater audience engagement (Nash, 2023). Moreover, some scholars have underlined the regulatory challenges and the need for a regulation for virtual influencers (Sands et al., 2022).

<u>Trend.</u> Virtual influencers may also have a significant impact on consumer behavior (Allal-Cherif et al., 2024), thus impacting market and consumption trends. Indeed, their attractiveness can stimulate the desire for imitation and influence purchase intentions (Kim & Park, 2023). Furthermore, the role of virtual influencers also extends to corporate social responsibility (CSR) campaigns, where they may have great impact (Yang et al., 2023). Ham and colleagues (2024) highlighted that, in general, virtual influencers who express positive emotions, such as happiness, are able to increase follower engagement and more strongly influence consumer behavior, thus impacting positive lifestyles in the food sector.

Findings also show that human influencers may impact consumer behavior based on audience segmentation, thus highlighting the importance of correct targeting choices (Deng et al., 2022). The literature also underlines that human influencers in the food sector can actively promote home cooking and healthier lifestyles (Sokolova et al., 2024). In particular, female influencers committed to sustainability, known as green women influencers, modulate consumer choices through authentic storytelling practices, guiding the public towards more responsible and conscious decisions (Yildirim, 2024).

However, although the literature on the role of influencer marketing offers many valuable contributions, there are still several areas that remain underexplored. In particular, the impact of cultural context on the effectiveness of influencers is a topic that has not been widely studied, as are the legal and regulatory implications related to the use of virtual influencers in the food and beverage sector. The ACT Model can serve as a structured framework for future research in these areas, providing useful insights into how attraction, connection, and trend-creation dynamics may differ across cultures or be influenced by specific regulations. Additionally, the model can support studies that examine the ethical and social implications of employing virtual influencers in sensitive sectors such as food marketing.

Research limitations. *The research project still has some limitations. Currently, one limitation is represented by the sample size due to the relatively short period considered, thus future studies could extend the number of papers by considering wider time ranges. Furthermore, the present study had explorative goals, and the adopted methodology (a literature review) didn't allow us to identify clear and relevant relationship among the variables. Therefore, future studies rather than having a generic focus may concentrate on specific aspects.*

Managerial implications. *From a theoretical perspective, this paper contributes to the literature on influencer marketing with a focus on the food and beverage sector, by providing the ACT framework, which helps scholars to identify themes for future research. It offers a classification organizing the literature in three interrelated topics (Attraction, Connection and Trend), helping scholars in having a more unitary view of the state of art on the specific research field. From a practical point of view, the ACT framework may help companies and managers to identify digital marketing strategies to adopt. Indeed, virtual and human influencers may be used by companies in terms of brand strategies, promotional campaigns, launch of new products or services on the market (Audrezet & Koles, 2023). Moreover, influencers may be employed as communication tools, thus they act as bridge between companies and consumers, which in turn are influenced in terms of purchase intention (Wong, 2014). This study also provides insights for food and beverage companies, which may leverage these findings to communicate advantages of their offerings through influencers.*

In this sense, a hypothetical application of the ACT Model could involve a restaurant brand aiming to promote a new concept of a "virtual dining experience." Following the model's dimensions, the brand might initially collaborate with virtual or human influencers to spark curiosity and position itself as an innovator in the sector (Attraction). Next, it could organize interactive digital events or live sessions where influencers engage directly with the audience, strengthening emotional bonds and customer loyalty (Connection). Finally, by leveraging the generated content and engagement, the company could help launch or reinforce a market trend linked to "phygital dining," blending physical and digital experiences (Trend). This example illustrates how the ACT Model can assist companies in developing integrated strategies that align with specific objectives across the different stages of the digital marketing process. Nevertheless, while this practical application is promising, it is important to note that the ACT Model is currently the result of literature-based analysis, and its implementation could provide a valuable opportunity for empirical validation.

Originality of the paper. *This study offers an innovative perspective on influencer marketing in digital environments, with a specific focus on the food and beverage field. Through the development of the ACT model, our study offers an integrated perspective on the role of human and virtual influencers, which the literature tends to analyze separately. Specifically, the ACT model proposes a dual classification. The first distinguishes the literature based on the type of influencer (human or virtual); the second categorizes studies into three key research areas (Attraction, Connection, and Trend), which help to understand how influencers attract audiences, build connections, and influence consumer behavior.*

However, in addition to offering this dual classification, the innovative aspect of the ACT Model lies in its analysis of psychological dimensions (such as credibility and empathy), which provide a clear understanding of the dynamics and impact of influencer marketing on consumer behavior and the creation of market trends. Moreover, the three pillars of the theoretical model (Attraction, Connection, and Trend) were not defined arbitrarily but emerged inductively from a thematic analysis of the literature, representing the most recurring patterns identified in recent studies. More specifically, these three dimensions were identified through thematic coding of the selected studies, which consistently highlighted factors related to attraction (credibility, visual appeal), connection (engagement, empathy), and trend creation (behavioral change, market impact). This demonstrates that the ACT framework is grounded in empirical patterns and does not merely represent a theoretical abstraction.

At the end, the ACT Model thus provides a basis for the development of future research and may represent a practical tool for food and beverage companies that need to understand the different potentialities behind influencer marketing strategies.

Keywords: *influencer marketing; digital marketing; virtual influencer; human influencer; digital environmental; food; beverage*

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Managing Complexity in New Product Development: A Framework for Assessing and Mitigating Over Featuring

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Abstract

The tendency to develop products and services that exceed user needs, market demands, and organizational resources is recognized as one of the top 10 risks contributing to New Product Development (NPD) failures. This phenomenon, commonly referred to as Over-Featuring (OVF), describes the tendency to introduce excessive or unnecessary features into a product or service during the NPD process. As a result, the process may suffer from scope creep, where the project's scope expands beyond its initial plan, and feature creep, where additional functionalities are continuously added during development. It can also lead to reduced usability, quality issues, feature fatigue, overdesign, overspecification, and poor project performance.

Despite its critical implications for NPD, OVF has received limited academic attention, with a lack of empirical studies and the absence of robust tools to measure and manage its impact.

This research aims to address these gaps by first conducting an experimental study to investigate and demonstrate how OVF manifests, analyzing the key actors involved: customers and firms, and their interactions. Once the evolution of the phenomenon is thoroughly assessed, the next step will be the development of a framework and practical tools to support evidence-based decision-making in the NPD process.

Framing of the research. *The impact of Over-Featuring (OVF) is significant, with organizations such as NASA recognizing it as a major risk in development projects. OVF spans multiple fields, including innovation management, R&D, engineering, and design, and can emerge at any stage of product development when a product exceeds user needs, market demands, or a firm's available resources. This phenomenon contradicts established design principles such as KISS (Keep It Simple, Stupid) and Occam's Razor, which advocate for simplicity and efficiency.*

Existing literature provides numerous studies aimed at identifying the potential causes (antecedents) and corresponding consequences (outcomes) of OVF (Marzi, 2022). Several studies highlight the significant role of human behaviour and cognitive biases among managers and developers, such as the endowment effect, IKEA effect, and I-designed-it-myself effect (Shmueli et al., 2015), all of which reflect the willingness to develop the "best possible product" (Belvedere et al., 2013). In addition, the fuzzy front end and the uncertainty inherent in the NPD process amplify the problem of OVF. This uncertainty makes it difficult to accurately understand customer needs and requirements, often leading developers to adopt a "leave all option open" strategy to accommodate potential future product adjustments and modifications (Gillier, 2015; Marzi, 2022).

On the other hand, extensive analyses have examined the outcomes of OVF, notably Feature Fatigue, described as "the tendency to overwhelm consumers by including too many features in products" (Thompson et al., 2005). Other critical outcomes include quality issues, unmet customer expectations, budget overruns, project delays, and loss of strategic focus (Marzi, 2022).

The existing literature demonstrates that the OVF presents significant risks for both customers and firms. For firms specifically, this often results in higher costs, decreased revenues, and delays that can adversely affect time to market. Despite these important implications, existing studies often treat these phenomena as independent and separate elements, overlooking the intrinsic complexity of OVF, which arises from the simultaneous interaction of multiple causes and their effects.

The lens of analysis proposed in this research offers a more detailed and integrated framework for understanding the OVF phenomenon by examining it in two distinct domains: the firm and the customer.

On the customer side, two macro-temporal phases can be distinguished (Thompson et al., 2005):

- *Before Product Use: in this phase, customers often associate greater number of features with better performance, leading to a preference for products with extensive functionalities, regardless of other decisional variables. Capability is prioritized over usability before-use.*
- *After Product Use: in this phase, customers realise that excessive features can hinder usability, leading to frustration and potential non-repurchase. Usability becomes more significant than capability post-use.*

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On the firm side, the identified macro-temporal phases are as follows:

- *Fuzzy Front-End: this phase is characterized by high uncertainty which complicates the identification of customer needs and requirements, leading to strategies that increase unnecessary features.*
- *Development and Launch Phase: during this phase, features added in the fuzzy front-end often result in scope creep, project delays, and budget overruns (Marzi, 2022).*

Among the outcomes of OVF, feature fatigue is the phenomenon that appears to have the greatest impact on the end customer and requires further exploration in this study. In the relevant studies and experiments by Thompson et al., 2005, the trade-off between usability and capability is primarily analysed, along with how the weight assigned to these two variables changes before and after product use, demonstrating that capability is prioritised over usability before use, and vice versa after use.

Referring back to the two hemispheres mentioned at the beginning of this article, the firm side and the customer side, and analysing experimental study by Thompson et al., 2005, it appears that the focus is primarily on estimating the optimal number of features from the customer side, without considering the firm side. Specifically, how do project costs, timelines, and scope vary in relation to the number of features?

Understanding this analytical framework is crucial, as customers and firms are the two key actors in the OVF phenomenon. Although their interests may appear divergent, both parties are driven by an initial desire to achieve the "best possible product." However, this pursuit results in consequences that adversely affect them in different ways, leading them to reconsider their choices when it may already be too late.

Purpose of the paper. *The increasing complexity of products and services in modern markets poses significant challenges for firms seeking to balance innovation, customer satisfaction, and operational efficiency. This study investigates Over-Featuring (OVF), considering that, although firms and customers have different perspectives on what constitutes the "best possible product", both are driven by the intention to maximize value, often leading to unintended consequences.*

If we were to allow customers the possibility to freely configure their products with all the features they think they want, there would be a high probability that they would choose the maximum number of features available to them. However, if we were to ask them after using the product how many of those features are truly useful, what features provide real added value, and if there are any features they would like to eliminate because they lead to fatigue and make the product less user-friendly, they would likely indicate that if they could reconfigure their product now, they would not choose some of the features they had selected before. (Thompson et al., 2005, Jain, S., 2019, Rust, R.T., et al. 2006). This suggests that customer experience significantly influences perceptions of product features over time. Understanding how initial expectations shift post-use is crucial in addressing the nuances of OVF (Rahman, M., 2009). As a result, we posit the following hypothesis:

Hypothesis 1: The optimal number of features from a customer perspective decreases negatively after product use.

Hypothesis 2: The decrease in the optimal number of features is due to the presence of too many features in a product, leading to fatigue and poor usability.

The competitive pressure in modern markets compels firms to continuously innovate and enhance their product offerings. However, as Buschmann (2010) highlights, this drive can lead to "featuritis", where companies add excessive features in an attempt to meet customer expectations. This approach often overlooks quality and usability issues, resulting in products that may impress but fail to deliver an optimal user experience.

Similarly, Elliott (2007) discusses the challenge of "feature creep," where the continuous addition of features complicates products and detracts from their practicality. While diversifying features can seem advantageous, it risks overwhelming customers with unnecessary options (Buschmann, F., 2009, Buschmann, F., 2010, Elliott, B., 2007). In light of this, we propose:

Hypothesis 3: Firms tend to add more features than necessary with the goal of meeting customer expectations, focusing more on impressing them with a large number of innovative features rather than addressing potential quality defects and usability issues that may arise.

Firms often overestimate the value of additional features due to cognitive biases and market uncertainty, leading to detrimental effects on product development. Bjarnason et al. (2012) investigate this phenomenon in large-scale software engineering, highlighting that overscoping, where firms add more features than necessary, can arise from misjudgments regarding stakeholder needs and expectations. The authors argue that cognitive biases, such as optimism bias, can cloud decision-makers' assessments, causing them to perceive additional features as more beneficial than they truly are, ultimately resulting in wasted resources and potential project failures.

In a complementary study, Shmueli, O., et al., (2015) examine the behavioral dynamics behind over-requirement in software development projects. Their experimental findings reveal that decision-makers frequently exhibit overconfidence in the value of added features, driven by the uncertainty of market demands and competitive pressures. This tendency not only distorts feature prioritization but also diverts attention from addressing existing quality defects and usability challenges. Thus, we propose:

Hypothesis 4: Firms tend to overestimate the value of additional features due to cognitive biases and market uncertainty.

To effectively address the challenges of Over-Featuring (OVF) in new product development (NPD), it is essential to consider the role of decision-support tools that leverage empirical data. These tools are crucial for enhancing the efficiency and effectiveness of NPD processes, as they provide valuable insights that enable firms to make informed decisions regarding feature selection. By utilizing data-driven approaches, companies can better align their offerings with customer needs and navigate the complexities of modern markets. Furthermore, various frameworks and methodologies facilitate the optimization of product development efforts, highlighting the importance of empirical data in mitigating risks associated with feature overload (Töytäri, P., et al.,. 2018). Thus, we posit:

Hypothesis 5: Decision-support tools based on empirical data can mitigate OVF by optimizing feature selection during NPD.

The objective of this research is to bridge the gap between firm-driven and customer-driven decision-making in NPD by providing a structured framework for managing feature selection. To achieve this, the study integrates theoretical insights and empirical analysis and is structured around an experimental investigation involving both customers and firms, followed by an analysis of their interactions to assess the OVF phenomenon.

Considering the hypotheses defined earlier, we aim to test these hypotheses through our investigation, guided by the following research questions:

1. *What is the optimal number of features in terms of the trade-off between capability and usability for the consumer? How can it also be optimal in terms of costs, timelines, and scope within the NPD project? How can it be aligned with project performance and optimisation?*
2. *In what way is the optimal number of features that are advantageous from a market perspective a function of the antecedents identified on the firm side?*
3. *What is the key to planning and defining an NPD process that, while adhering to project boundaries, generates an output with the exact number of features optimal for the market and the firm?*

The answers to these questions represent the objective of the experimental study, which is to leverage frameworks from strategic management, behavioral decision theory, and operations management to examine the interplay between these perspectives. By integrating insights from these fields, the research contributes to the growing body of literature on product innovation, behavioral decision-making, and operations management by providing a holistic view of OVF and its implications. Through this experimental study involving both firms and customers, the findings will offer actionable insights to optimize feature selection and enhance NPD efficiency.

Methodology. *The methodology of this research is based on an experimental study designed to examine the interplay between the two key actors: the customer and the firm. It is structured into five distinct research streams to understand the complexities inherent in the phenomenon of OVF during the NPD process. These research streams are structured as follows:*

- *Study 1 - Customer Side: Before Use*
  This study aims to simulate customer behavior before product use. The primary goal is to determine the optimal number of features from the customer's perspective. The expected outcome includes identifying not only the ideal number of features but also which specific features are added during product configuration to best align with consumer preferences and expected utility before use.
- *Study 2 - Customer Side: After Use*
  This study aims to simulate customer behavior after product use by assessing user performance in completing tasks with different demo versions of the product having varying numbers of features. Participants will interact with these different versions, allowing for an evaluation of their post-use preferences. The expected outcome includes usability ratings among the different product configurations to provide insights about how direct experience influences consumer perception of the optimal number of features.
- *Study 3 - Firm Side*
  This study involves managers and software developers to simulate firm behavior during the NPD process. Setting the project boundaries such as time, budget, and scope, managers and developers will be asked to configure the product they believe is best, as they would within their teams during the NPD process. The expected outcome is the best product configuration from the firm's perspective.
- *Study 4 - Bridging the Gap: Aligning Customer Preferences with Firm Decisions*
  Building on the results of the first three studies, this final study aims to determine the optimal number of features from the customer perspective by balancing before-use expectations (Study 1) and after-use evaluations (Study 2), as well as the ideal product configuration. This product configuration will then be compared with the product configuration obtained in the Study 3 from the firm's perspective, allowing us to assess the alignment between organizational decisions and consumer preferences, and evaluate how closely the firm's designed configuration in Study 3 matches the consumer-driven optimal configuration. This matching analysis will be crucial for understanding the gap between the choices of the two key actors. Following the hypothesis that there will be a mismatch, this analysis will help

investigate the antecedents that lead developers to add additional features that customers perceive as lacking real value.

- *Study 5 - Comprehensive Final Assessment*

  To investigate the antecedents, a further planned research step involves presenting the results of the fourth study to the managers and developers who participated in study three.

This presentation aims to assess the underlying reasons that drive them to add certain features, specifically, those that are not selected by customers even in the most optimal configuration, in order to identify and define a recurring error pattern: what are the most recurrent antecedents that lead to product configurations misaligned with market choices? Conversely, it also aims to understand the motivations behind the inclusion of high-value features that align with the best configuration, thereby establishing a reference pattern for effective decision-making.

Additionally, the study will explore how their choices might change when they are informed about customer preferences and behavior, demonstrating the practical relevance of the tool being developed. Based on the evidence obtained, this methodological approach contributes to the overarching objective of this research: the development of a framework and practical tools that support evidence-based decision-making in the NPD process.

Participants will be recruited using purposive sampling tailored to the specific needs of each study.

For consumer-oriented studies (Studies 1 and 2), participants will be recruited via institutional mailing lists or distributed at scale through networks and social media, targeting adult users with familiarity or potential interest in the product domain (e.g., digital tools or apps).

For firm-oriented studies (Studies 3 and 5), participants will be professionals actively involved in product development, such as software developers, product managers, and innovation leads, recruited through professional networks, innovation-oriented organizations, or online platforms such as Prolific, using filters to ensure relevant industry experience.

An overview of the five research streams is presented below:

Study	*Focus*	*Linked Hypothesis*	*Participants*	*Data to be Collected*
1	*Customer (Before Use)*	*H1*	*consumers*	*Feature selection and perceived utility before use*
2	*Customer (After Use)*	*H1, H2*	*consumers*	*Usability ratings, task performance, feature valuation post-use*
3	*Firm Perspective*	*H3, H4*	*firm participants*	*Feature selection rationale, configuration choices*
4	*Customer-Firm Alignment*	*H1-H4*	*n/a (prior data)*	*Alignment gap, feature match/mismatch*
5	*Antecedents of Misalignment*	*H4, H5*	*Same as Study 3*	*Reflections on past decisions, attitude changes post-feedback*

Results. *As the data collection process is scheduled for the near future, results are not yet available. Below, we present a list of well-supported hypotheses that are intended for empirical testing:*

Hypothesis 1: The optimal number of features from a customer perspective decreases negatively after product use.

Hypothesis 2: The decrease in the optimal number of features is due to the presence of too many features in a product, leading to fatigue and poor usability.

Hypothesis 3: Firms tend to add more features than necessary with the goal of meeting customer expectations, focusing more on impressing them with a large number of innovative features rather than addressing potential quality defects and usability issues that may arise.

Hypothesis 4: Firms tend to overestimate the value of additional features due to cognitive biases and market uncertainty.

Hypothesis 5: Decision-support tools based on empirical data can mitigate OVF by optimizing feature selection during NPD.

The findings from the experiment will provide the theoretical foundation for the development of the proposed tool.

As outlined in the "Study 5 - Comprehensive Final Assessment" section, the goal is to identify recurring patterns, both effective patterns and error patterns, and use them to build an algorithm. This algorithm will act as a real-time alert system, warning project managers and developers when their decisions align with patterns associated with a rising risk of OVF.

In practical terms, and in line with the insights of Bianchi et al., 2020 for managing NPD through a hybrid approach, this tool will be developed to function within a hybrid Stage-Gate and Agile framework. Specifically, at each iteration of the Agile cycle, when previously selected features are reassessed, the tool will serve as a feedback mechanism to improve alignment with market needs.

The process will unfold as follows:

Concept Phase: At the initial stage, all selected features will be identified, and each must be linked to the specific requirement it addresses. At this point, the tool will generate a set of targeted questions designed to assess whether the

decision-making process is influenced by the same behavioral drivers that, in previous cases, led to suboptimal choices. These questions will challenge assumptions and provide a structured way to assess the likelihood of falling into an error pattern (the risk level of OVF). Some example question can be:

"Are we adding this feature based on validated customer needs and real data, or is it just an assumption?" Or "Does this feature directly address a current requirement, or are we keeping it on the table for potential future needs?"

In this way each feature will be assigned an OVF risk level, alongside its planned cost, time investment, and scope.

Iterative Refinement: During subsequent sprints, teams will reassess each feature based on feedback, deciding whether to keep, improve, or eliminate it, taking into consideration also the previously established OVF risk level. This assessment will involve further questioning, such as why a feature should be retained, improved, or eliminated continuously updating the OVF risk level. This iterative questioning will help refine the product while continuously updating the project's history.

A key strength of this tool will be its integration of AI-driven learning, allowing it to store data over time and tailor its recommendations to the specific characteristics of the firm. However, while the tool aims to prevent misalignment and feature overload, it will also be designed to recognize when breaking away from existing customer requirements is necessary for disruptive innovation. As Verganti, 2017 highlights, people are not seen as "bags" of needs (negativities) that must be fulfilled, but as reservoirs of aspirations (positivities) that constantly evolve to maintain fit with the chancìge environment. So true innovation often challenges what customers think they want, as their preferences are inherently shaped by past experiences. If a feature is introduced with the explicit reasoning that it represents a disruptive innovation, rather than a mere response to past demand, the tool should not automatically classify it as a risk or negative pattern. Instead, it should help teams assess whether the feature has the potential to redefine customer expectations, rather than just conforming to them.

By embedding this tool into the NPD process, the aim is to provide project teams with a data-driven decision support system, minimizing the risks of misalignment while enabling strategic, market-responsive, and innovation-driven product development.

Research limitations. *The experimental study will be conducted through interactions with consumers and firms, focusing on the analysis of features within a web application. By centering the investigation on a software application, the study is constrained by its specific focus on this sector, specifically examining the dynamics of feature selection within this realm.*

The findings are based on the particular context of software applications, which may limit the generalizability of the results to other product categories or industries. While the insights gained from this research can be invaluable for developing user-centered applications, they may not necessarily apply to different contexts, such as hardware products or services.

Additionally, the reliance on a specific type of application and user demographic could introduce biases, necessitating further validation in diverse software environments. Future research should explore longitudinal studies that track the evolution of Over-Featuring (OVF) over time, especially as user feedback and market demands shift. Understanding how OVF manifests in various types of applications will provide a more nuanced perspective on its impact and inform strategies for effective feature selection.

Furthermore, the experimental design relies on the assumptions and behaviors of users interacting with specific software applications. Additional studies across different user groups and application types will be essential to comprehensively assess the effectiveness of the proposed mitigation strategies for OVF.

Managerial implications. *Understanding OVF can help managers refine their feature selection process, aligning product development with customer needs while optimizing resource allocation. By leveraging empirical data and structured decision-making tools, firms can improve project efficiency and market success.*

Particularly, within the context of software applications, by refining the feature selection process, managers can align product development more closely with customer needs while optimizing resource allocation. The proposed evidence-based decision-making tool offers a structured approach to mitigate the risks associated with OVF, providing several key benefits for management:

- *Data-Driven Insights: By utilizing empirical data and structured decision-making tools, managers can make informed choices regarding feature inclusion. The tool's algorithm identifies recurring patterns, both effective and erroneous, allowing project teams to discern which features align with market demands and which may contribute to OVF. This enhances the decision-making process, ultimately leading to more successful product outcomes.*
- *Real-Time Feedback Mechanism: The tool functions within a hybrid Stage-Gate and Agile framework, providing real-time feedback at each iteration of the Agile cycle. This continuous reassessment of features ensures that project teams remain responsive to evolving customer needs and market dynamics, fostering an agile approach to product development that minimizes the risk of misalignment.*
- *Risk Assessment: Each feature is assigned an OVF risk level based on targeted questions that challenge assumptions about customer needs. This structured risk assessment enables managers to prioritize features based on their potential impact, allowing for more strategic resource allocation and ensuring that development efforts are focused on features that deliver genuine value to customers.*

- *Iterative Refinement and Learning: The iterative nature of the decision-making process encourages teams to continually reassess and refine features based on user feedback. This not only enhances product quality but also creates a culture of learning within the organization, where insights from past experiences inform future decisions.*
- *Encouraging Disruptive Innovation: While the tool aims to prevent misalignment and feature overload, it also recognizes the importance of innovation. By providing a framework that distinguishes between incremental improvements and disruptive innovations, managers can make strategic decisions about when to introduce features that may challenge existing customer expectations. This approach aligns with the notion that true innovation involves redefining customer needs rather than merely fulfilling them.*
- *Customizable Solutions: The integration of AI-driven learning allows the tool to adapt to the specific characteristics of each firm, tailoring its recommendations to fit unique organizational contexts. This adaptability ensures that the tool remains relevant and effective as market conditions and customer preferences evolve.*

In conclusion, by embedding this evidence-based decision-making tool into the new product development (NPD) process, managers are equipped with a robust system that minimizes the risks of misalignment while facilitating strategic, market-responsive, and innovation-driven product development. This approach not only enhances operational efficiency but also positions firms to better meet the needs of their customers in a competitive landscape.

Originality of the paper. *This study significantly contributes to the literature on new product development (NPD) by systematically analyzing OVF within the context of software applications. Unlike previous research that often addresses isolated aspects of product complexity, this work adopts a holistic perspective that integrates both user and developer viewpoints.*

By examining the interplay between user expectations and development strategies, this study highlights the multifaceted nature of OVF and its implications for the development of software applications. It provides a comprehensive framework that identifies the factors contributing to OVF and outlines actionable strategies that developers can employ to mitigate its impact.

The originality of this research lies in its focus on empirical evidence and practical solutions tailored to the unique challenges of software development. By leveraging real-world data from applications, this study establishes a robust foundation for its recommendations, bridging the gap between theoretical insights and practical application. This contribution is particularly relevant in today's rapidly evolving digital landscape, where innovative solutions are essential for optimizing user experiences and enhancing the effectiveness of applications.

Key words: *Over-Featuring; New Product Development; Decision-Making; Feature Fatigue; Product Complexity.*

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Technological Characteristics and Technological Competition. A Patent Portfolio Perspective on Inventions' Non-use

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Abstract

More than forty percent of patented inventions remain unused, a finding that has been consistently observed across empirical studies and in different contexts (Giuri et al., 2007; Walsh et al., 2016). The phenomenon has attracted attention in competition policies and strategic management and the economics of innovation literature. Scholars have explored the antecedents of non-use at the invention level (Walsh et al., 2016; Torrisi et al., 2016; Cappelli et al., 2023). We align with this line of research and explore the relationship between technological characteristics, technological competition, and invention non-use and its subcategories. While previous research has assumed that one or a few patents mirror a firm's innovation management strategy, the necessity to understand patent strategies from the portfolio perspective has already been highlighted by Blind et al. (2006; 2009) and recently reinforced by Cappelli et al. (2023). Therefore, we exploit and leverage the complete patent portfolio of a leading multinational company in the material processing industry and capture interdependencies between a set of explanatory mechanisms and strategic non-use. Based on a survey of 303 company inventions, combined with rich primary and secondary data, we propose a preliminary analysis toward the understanding of novel patterns of patent non-use. Our findings show that, while technical attributes and technological rivalry do matter when considering unused inventions, classical indicators of value/importance and intra-organizational factors also significantly relate to patent non-use and its typologies. The paper continues with managerial implications and suggests intriguing developments for the current work and patent non-use scholarship.

Framing of the research. *In many industries, patents serve as the most important form of appropriation mechanisms and represent crucial resources for creating and securing competitive advantage (Markman et al., 2004). Patent literature, along with the patent system, has largely focused on technological commercialization, often seen as the pinnacle of a firm's competitiveness and value creation (Cohen et al., 2002; Blind et al., 2009). However, the motivations for patenting can vary, extending beyond traditional commercialization objectives to include blocking competitors, preventing imitation, and enhancing a firm's reputation (Blind et al., 2006; Giuri et al., 2007). In this context, Somaya (2012) emphasized the role of patent strategies, describing them as a set of resource allocation decisions and logics related to the management of patents. From this perspective, unused patents are also considered within the definition of patent strategies. Literature has discussed strategic non-use, referring to patented inventions that are not directly used to prevent imitation for commercial purposes but still serve a strategic role as powerful tools in technological competition (Torrisi et al., 2016; Walsh et al., 20216; Corsino et al. 2018; Cappelli et al., 2023). Existing literature has empirically investigated invention-level non-use and identified various categories of unused patents. For example, Torrisi et al. (2016) distinguished between commercial use, strategic non-use, and sleeping patents - those filed for reasons other than commercial or blocking competitors. Meanwhile, Walsh et al. (2016) developed a taxonomy of twelve reasons for non-use, later aggregated into three types: prospective non-use, preemptive non-use, and failed patents. Recently, Cappelli et al. (2023), drawing on the RBV and appropriability literatures, classified strategic non-use into play strategy and fence strategy, respectively referring to patents filed for cross-licensing and those filed to block competitors. In our work, we will adopt Walsh et al. (2016)'s classification and refer to non-used inventions as those that are neither commercially utilized nor licensed, preemptive patents are those unused inventions that maintain monopoly or bargaining power over potential competitors, prospective patents are those that are unused but could still potentially be commercialized. Finally, failed patents are those inventions that have experienced technological or market obsolescence, resulting in low value.*

Extant literature has tested numerous classical indicators of invention's value and importance on the relationship with patented inventions' non-use. Scholarly production has already found significant correlation between a series of standard patent variables - like grant, family size, scope - and inventions' introduction to market, as well as citation flows and strategic non-use (Wagner & Wakeman, 2016; Corsino et al., 2018). Blind et al. (2006; 2009) from their side, proposed that patent portfolios that show technological core, and technological valuable bases are more likely to be associated with offensive and defensive blocking patent strategies. Both Torrisi et al. (2016) and Walsh et al. (2016)

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found significant results on the positive influence of technical value and unused inventions. We align to this line of inquiry and explore the technological attributes that lead to non-use at the invention level. First, we focus of technological scope, a concept introduced by Lerner (1994), which has already been linked to overall firms' value and invention value (Gambardella et al., 2007), but never to patent non-use. Second, we take the concept of proximity to the core-business, building on Cappelli et al. (2023), who found that the moderating role of proximity to core technologies in technological competition leads to a significant higher likelihood of building patent fences. Finally, in line with the literature on firm's experimentation and search, we concentrate on inventions' uniqueness, conceptualized as inventions that show a combination of components that have never appeared before and suggest that unique inventions might be related to longer and more uncertain paths of search (Vinokurava & Kapoor, 2020). By incorporating these variables, we aim to uncover the technical attributes of patents that shed light on patent non-use and firms' technological search strategies.

Inventions' attributes alone are insufficient to explain patent non-use. Indeed, when considering a viable patent strategy, firms take into account multiple factors, encompassing technological and industrial environment, as well as institutional, appropriability conditions and competition (Ceccagnoli 2009; Somaya, 2012). Interestingly, technological competition has already emerged as one of the explanatory factors of patent non-use. For example, Walsh et al. (2016) have proposed a more aggregated measure of competition at the industrial level, finding that the number of competitors in the industry increases the rates of preemptive patents. By their side, Cappelli and Colleagues (2023), have offered a more perceptional dimension of rivalry, based on the inventors' that were experiencing competition from many external parties and that was associated with a significant increase in the probability of adopting a play strategy and decrease in the likelihood of adopting fence strategy. Finally, Torrisi et al. (2016) focused on the number of competitors in the same technological field and the competition that the firm reports during the research process leading to the patent. In the former case, they discovered a significant relationship with patent fences. We focus on the rivalry within the technological area, as technical competition goes beyond organizational rivalry to include competition between technologies. Patents capture knowledge and inventive efforts, providing insight into an organization's search strategies. In this context, patenting - and its use or non-use - represents a process of technical experimentation and learning, influenced by both the invention's characteristics and competitive pressures from external technologies in the same domain (Somaya, 2012; Arts et al., 2013).

To summarize, analyzing patent non-use at the invention level has been a common theme in existing research (Arora & Athreye, 2016). Previous studies have mainly focused on patent use through large-scale surveys (Cohen et al., 2000; Giuri et al., 2007). However, as Cappelli et al. (2023) point out, patent strategy involves balancing complex and often conflicting costs, risks, and benefits, making it unlikely that a single patent - or even a few - can fully reflect an organization's overall patent portfolio strategy. Blind et al. (2009) previously analyzed surveys from hundreds of German companies, shedding light on the motives behind patenting and offering an aggregated firm-level portfolio perspective on the phenomenon. Our study adopts a single-firm perspective, analyzing the full firm's patent portfolio in detail and exploring patent non-use at the invention level. By applying the categories proposed by Walsh et al. (2016), we link them to the technological content of patents and the competitive pressures they face within their technological environment. Our goal is to examine whether these factors are significantly associated with patent non-use as part of the firm's broader IP management and search strategies.

Purpose of the paper. *The purpose of this work is to examine the relationship between technological characteristics, technological competition and non-used patented inventions and their typologies from the perspective of the complete patent portfolio of a multinational enterprise. By doing so, we address the limitation highlighted by Cappelli et al. (2023), who argued that focusing on a single patent application rather than an entire patent portfolio may not fully capture an organization's overall strategy. While a single patent can serve as a proxy for an organization's inventive strategy decisions - an approach already adopted in various studies - the assumption remains strong, necessitating a more granular analysis of the phenomenon. Accordingly, we formalize the following research question: How do the technological characteristics of inventions and technological competition relate to their use and non-use, and its subcategories? By answering this question, we aim to deepen the understanding of patent portfolio management and investigate how both internal factors - such as the technological attributes of inventions - and external factors - such as competitive pressures in the technological area - may influence subsequent usage or non-use.*

We expect that both the technical characteristics of inventions and the level of technological competition in their respective fields will show significant correlations and differences between used and non-used groups. Regarding technological characteristics, we focus on three key aspects. First, we examine the number of technologies an invention incorporates as a proxy for technological scope. Prior literature suggests that patents covering a broader range of technologies are more likely to be used (Lerner, 1994; Gambardella et al., 2007; Wagner & Wakeman, 2016), so we expect a positive correlation and higher mean values for used patents compared to unused ones. Second, we analyze the core-technology ratio, which reflects how closely an invention aligns with the firm's main technological area. If firms patent around their core business to create protective barriers (Blind et al., 2009; Cappelli et al., 2023), we expect that non-used patents will show a positive correlation and higher core-technology ratio than used ones. Third, we consider the uniqueness of an invention's technological combination. More unique inventions may require longer development cycles before practical application, suggesting that unused patents will exhibit a positive correlation and higher mean uniqueness scores compared to used ones (Vinokurava & Kapoor, 2020).

For technological competition, we assess four indicators. The first is the number of competitors in a given technical area in the year of the invention. The second and third indicators measure technological concentration, based on the

share of patents held by the top one and top four players in the technical field and year. We expect that non-used inventions will show higher technical concentration and a positive correlation with technological rivalry variables. Lastly, we examine whether the invention belongs to a technological class with relatively few patents. A lower number of patents in a given area could indicate reduced competition, leading us to expect a negative correlation and lower mean values for non-used patents, as firms may prefer entering less congested areas with commercialized inventions (Gambardella et al., 2007; Arts et al., 2013).

We also anticipate varied associations across different types of non-use. Specifically, we expect prospective inventions to show a positive correlation and higher average number of technologies, as broader technological scope may require more time for adoption. We hypothesize that prospective non-use will display a lower core-technology ratio and higher uniqueness average scores, showing negative and positive correlations, respectively. Failed inventions may exhibit higher technological breadth, a greater core-technology ratio, and more unique technological combinations. Regarding technological competition, we expect that preemptive and failed patents will significantly correlate with competitive pressure, showing higher mean values compared to prospective patents, as firms may use preemptive non-use to block competitors or abandon patents in highly crowded areas.

In the following sections, we present our methodology and the results of the ongoing analysis. The remainder of this short paper discusses contributions and limitations.

Methodology. *We utilize a unique dataset that provides detailed information on a multinational firm's full patent portfolio, consisting of 1,156 patents filed between 2000 and June 2021. Initially, we conducted a survey with the managers and technical staff of the company's business units to gather data on the use and non-use of inventions. Our final sample includes 303 patent families, specifically those that were active - not abandoned by the focal company - at the time of the survey (June 2021). We surveyed 18 employees of the company - technical and product managers, directors, and some inventors - across 14 different business units. We asked questions regarding the perceived importance of the patents and the reasons for their non-use. As a result, we obtained complete information on 135 non-used patented inventions, which we linked to other dimensions recorded in the company's databases since 2016, such as technologies, business-unit information, and other patent bibliographic data. We then linked each patent to other archival sources, such as PATSTAT (2023), to create patent indicators based on various dimensions. The company's internal database employs different patent identification keys compared to publicly available databases, and for many observations, we could not find a direct match. Therefore, we manually cleaned and matched each patent, conducting thorough checks using multiple sources like ESPACENET and Q-PAT to track their history. We were unable to find correspondence for 3% of the surveyed inventions (11 out of 303). All patents were also merged with other internal datasets, like information on business units and patent renewal costs. Patent costs were calculated in collaboration with patent managers using data from patent office websites. The methodology developed for assessing the annual costs of maintaining a patent family has since been adopted by the company to guide detailed discussions on whether to renew inventions based on these costs. The second mechanism, technological competition, was captured by examining all players in the industry and their patented inventions from 2000 to 2022. To sample industry firms, we triangulated observations from three sources: the most comprehensive online encyclopedia of industry information, exhibitors from the most important biennial sector-specific fair, and the list of competitors monitored by the focal firm. We then reconstructed their business groups over time, which led us to identify 472 organizations active in the sector during the study period. We retrieved patents from these companies using PATSTAT (2023), resulting in a longitudinal dataset of over 10,000 inventions from 294 companies. Finally, we calculated measures of technological competition based on IPC classes in the same year as the focal firm's inventions. To summarize, the final dataset, along with the variables, is the result of primary and secondary data collected from different sources: a) the organization's internal database, which is divided into bibliographic and business-unit information and matched together; b) renewal costs data, which provides renewal and fee information; c) the survey on use and reasons for non-use of inventions; and d) PATSTAT2023, which provides archival patent data, joined with information from the focal company and all patenting firms within the industry.*

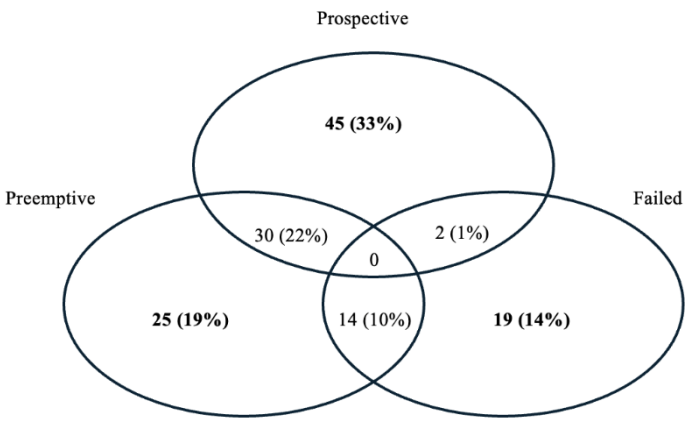
Additionally, we took part in the firm's annual patent renewal meetings with each business unit, where decisions were made regarding which patents were in use or not, the reasons behind their status, and which should be maintained. This experience provided key insights into the decision-making processes behind patent strategy formulation. Additionally, we engaged in ongoing discussions with patent managers and innovation directors, further deepening our understanding of how patent strategies contribute to the company's overall strategy. Due to non-disclosure agreements, we cannot provide detailed data from the interviews and renewal meetings. However, the insights gathered have been incorporated into our quantitative analysis, and where possible, we will include anecdotal evidence and justifications based on our field notes.

The focal company is a leading player in the material processing machinery industry, a manufacturing sector characterized by complex technologies where the incentives to protect intangible resources may differ from contexts where patents are discrete or from environments with different appropriability conditions (Cohen et al., 2000; Ceccagnoli, 2009). In this industry, inventions are mostly incremental and cumulative, but monitoring competitors' technical moves is a key element in formulating technological strategies, as patent competition is intense. Studying the categories of non-use in this industry provides a unique perspective, as this context has not been explored in innovation management and economics literature. Moreover, patent strategies and dynamics in this field may differ from those in fast-paced industries, such as pharmaceuticals or high-tech sectors (Cohen et al., 2002; Markman et al., 2004).

We examine the phenomenon at the invention level, treating patent per family, consistent with both prior literature (Dechezlepretre et al., 2017) and the firm's internal patent portfolio management strategy. Patent non-use is the primary outcome variable, taking a value of 1 if the patented invention is not used (i.e., not exploited for any commercial purpose), and 0 otherwise. The types of non-use are also operationalized as dummy variables, with mutually exclusive categories. Respondents could choose from fifteen non-use reasons, three more with respect to the original taxonomy from Walsh et al. (2016). These reasons were then aggregated into three main categories: preemptive, prospective, and failed patented inventions. A value of 1 is assigned if the main reason for non-use falls into one of these categories, and 0 otherwise. Technological characteristics variables were created based on primary data provided by the company. These variables include: count number of the invention's technologies (patent scope); core technology ratio, ranging from 0 to 1, with higher values indicating a larger share of core technologies within the total; and uniqueness, which takes a value of 1 if the invention presents a unique combination of technologies, and 0 otherwise. Each of the technological characteristic variables has an equivalent based on 4-digit IPC classes (Lerner, 1994; Squicciarini et al., 2013). For technological competition, the number of competitors counts the number of players active in a 4-digit IPC class in the year the invention was introduced (Torrisi et al., 2016). The remaining competition-related indicators are inspired by the work of Gambardella et al. (2007) and include two concentration ratios. These ratios measure the concentration of inventions among the top 1 and top 4 patentees in a given 4-digit IPC class for the year of invention. Values closer to 1 indicate that patent activity in that technological class is mostly in the hands of few players. We also included a set of classical patent value/importance indicators: granted invention, a dummy variable taking a value of 1 if the invention was granted; and family size, which counts the number of patent offices where the invention was applied for and extended (Dechezlepretre et al., 2017). These variables were derived from both primary and secondary data. Perceived patent importance is a variable available only for unused inventions, meaning that distributions and t-tests are computed solely for the subcategories of non-used inventions. Despite this limitation, we included it in the analysis as it provides valuable insight and serves as an alternative and robust measure of invention importance from the patentees' perspective. Additionally, we included variables related to the renewal process, as these are considered signals of the invention's value (Squicciarini et al., 2013). Finally, intra-organizational structure variables were calculated at the business-unit level, since business units are responsible for funding and managing their patents and they can influence inventions' non-use. For instance, we created a dummy for core business units that takes value 1 for the core business unit.

Results. *We created a comprehensive set of descriptive statistics, correlation matrices, and mean equality tests. The analysis is ongoing, and in the next steps, we plan to integrate the current work into inferential methods. In line with previous literature, we intend to use probit or logit regression models for binary use/non-use classification and multinomial probit or logit regression models for non-use categories (Torrisi et al., 2016; Walsh et al., 2016), depending on normality assumptions. These models will allow us to estimate the likelihood that an invention falls into the non-used category (or one of its subcategories) given our explanatory variables. In the figure below, we provide an initial overview of the distributions of unused inventions. Figure 1 presents the Venn diagram of patent invention non-use types. Percentages were computed based on the total number of unused inventions (135, 100%), considering all three reasons for non-use and possible co-occurrences between categories. In line with previous studies, unused inventions represent about 40% of the total portfolio. Similar to earlier research, prospective inventions are the most frequent category, followed by preemptive inventions and the co-occurrence of these two types, suggesting that strategic non-use is a dominant motive among unused inventions. Conversely, the percentage of failed patents is smaller, even when compared to earlier studies, which suggested that non-used patents could range between 30% and 50%. This highlights that the company tends to prioritize patents that are actively exploited, either for commercial purposes or for strategic non-use.*

Fig. 1: Venn Diagram of Invention Non-Use Types. (N = 135, 100%)



Digging deeper into the correlation and t-test results, we find several significant associations and differences in the average characteristics of used and non-used patents, as well as among different types of non-use. Used patents tend to exhibit higher average values than non-used patents across multiple measures of patent value and importance, such as granted status (0.43 for used vs. 0.30 for non-used, $p < 0.05$), family size (2.76 vs. 2.24, $p < 0.05$), and number of invention

renewals (15.76 vs. 9.43, $p < 0.01$). These differences suggest that used patents tend to have higher proxies of value/importance, aligning with the idea that firms prioritize protecting and developing inventions that are eventually commercialized. All of these variables significantly and negatively correlate with unused inventions. Among technological characteristics, non-used patents have a significantly higher core technology ratio than used ones (0.29 vs. 0.19, $p = 0.02$). Among the non-use types, failed patents have the highest core technology ratio (mean diff. -0.23, $p < 0.01$), suggesting that failed inventions might be more concentrated in areas where the firm is primarily focused. The average number of technologies incorporated in an invention does not differ significantly between used and non-used patents, but failed patents have a considerably higher mean number of technologies (mean diff. -0.30, $p < 0.05$) than the other non-use categories combined. This may suggest that patents with broader technological scope are more likely to be found among failed inventions rather than preemptive or prospective non-use, possibly because integrating multiple technologies successfully is more challenging, as evidenced by a positive and significant correlation ($r = 0.171$, $p < 0.05$). For technological competition, there is no significant difference in the mean number of competitors in the technological class-year between used and non-used patents (6.56 vs. 7.23, $p = 0.57$), and no significant correlation has been found. Technological concentration, as measured by the CR1 and CR4 indexes, does not show significant differences in most cases, apart from the mean of the CR1 index IPC4-year for preemptive patents, which, contrary to expectations, has a lower mean and a negative correlation at the 0.1 significance level. Failed inventions display slightly higher concentration values, though these differences do not reach the conventional significance threshold of 0.05. Some findings deviate from initial expectations. The average uniqueness of technological combinations does not significantly differ between used and non-used patents (0.05 vs. 0.02, $p = 0.23$), and it is not significantly correlated, neither between used and unused inventions nor across types of non-use. This may not support the hypothesis that more unique inventions would be associated with the non-use category, particularly in the case of prospective patents. However, perceived importance, which is available only for non-used patents, exhibits a significant mean difference across non-use types. Prospective inventions are assigned a notably higher perceived importance score (mean diff. -1.24, $p < 0.01$) compared to preemptive and failed patents. This suggests that prospective inventions, despite being unused, are rated as highly valuable, possibly due to expectations of future exploitation. It may indicate that prospective patents are more likely to be retained for strategic purposes rather than preemptively blocked or discarded as failed inventions. Organizational-structure factors also exhibit differences, such as core-business, which positively relates to failed inventions ($r = 0.170$, $p < 0.001$). Overall, the findings suggest that technological characteristics and competitive conditions play a crucial role in patent non-use. Some variables, such as proximity to the core and the presence of few competitors in the technological area, may have a significant impact on non-use and its subcategories. Moreover, used patents consistently show higher mean values across most importance/value indicators, as well as positive and strongly significant correlations, reinforcing the idea that firms primarily pursue a commercial strategy with their patents.

Research limitations. *First and foremost, this study does not provide direct evidence of the impact between the explanatory variables and the non-use phenomenon. Instead, it presents correlations and parametric tests on means, offering only an initial insight into significant associations and differences that may warrant further investigation. Therefore, we believe a relevant next step in this work would be to apply inferential methods to understand how the identified variables might influence the likelihood of non-use and its typologies.*

Second, this study examines strategic patenting from the perspective of a single firm within the materials processing machinery industry. While this focus offers a detailed view of patenting practices within this specific context and presents a unique approach to patent non-use, it also has limitations in terms of generalizability.

Moreover, the non-use survey data were collected at a single point in time, providing a static representation of patent use and non-use. However, patent use and non-use are dynamic processes that evolve over time in response to internal changes and shifting external technological pressures. Future research could build on our study by considering the dynamic nature of patenting decisions.

Although this study connects and advances existing literature, additional avenues could be explored to understand the underlying drivers of patent non-use or deepen the analysis of technological competition and its role in shaping strategic patenting decisions, such as investigating its moderating role. We plan to incorporate these ideas in the next steps of the work.

Managerial implications. *The study findings provide valuable insights for managers, particularly for those in firms with similar incumbency positions within mature industrial sectors. Patents are invaluable assets that can provide competitive advantage and financial value. However, they also come with significant costs, alongside continuous pressure from management to reduce inefficiencies. In this context, it becomes crucial to systematize non-use and differentiate between strategic non-use and low-value inventions. We argue that firms facing comparable technological and competitive pressures may encounter similar challenges in managing their patent portfolios. While the results are specific to the company studied, managers in other firms, particularly those in industries with similar technological regimes, could benefit from understanding the factors that influence the strategic use and non-use of patents. This study provides a data-driven approach for assessing patent portfolio management distributions. Additionally, our work builds on previous literature in the patent non-use space, advancing it by incorporating new reasons for non-use and original variables with rigorous analysis. By offering a more comprehensive view of patent use and non-use, our study equips managers with the tools to make informed decisions about a balanced IPR strategy. Ultimately, it highlights that non-*

used patents should not be seen as merely low-value failed inventions, but can serve as crucial strategic instruments to be leveraged both today and in the future.

Originality of the paper. *To date, available literature has primarily focused on single or few patented inventions within a firm's entire patent portfolio, which may not fully capture a firm's overall patent strategy or the strategic decisions behind non-use. We address this gap by providing an in-depth analysis of the entire patent portfolio of a leading organization in an original context such the materials processing machinery industry. Moreover, limited research explores the complex interdependencies between patent non-use, technological characteristics, and technological competition. We unpack these factors and connect them to different types of non-use, demonstrating how both technological attributes and competitive pressures can explain use, strategic non-use, and failed inventions. In addition, we explore how patent non-use may reflect broader organizational search strategies and learning processes, shedding light on how firms approach IPR management and resource allocation. Finally, we examine the perceived importance of patents, highlighting differences between used and non-used patents and offering valuable insights for innovation management decisions.*

Key words: *patent non-use; strategic non-use; technical characteristics; technological competition; invention value/importance; patent portfolio management*

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Employees' autonomy in data-driven decision-making: an empirical analysis of Italian firms

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Abstract

Digital transformation (DT) has steadily permeated industries and markets, becoming increasingly pervasive. DT spurs a fundamental shift in corporate decision-making, moving from intuition and heuristics to an analytical, data-driven decision-making (DDD) approach. While several studies uncover a positive relationship between DDD and firm performance, a comprehensive understanding of the drivers underpinning the systematic and effective use of data in decision-making is still lacking. Earlier research pointed out the role of factors such as the adoption of new digital technologies, the implementation of structured management practices, and the investment in complementary assets like human capital. This short paper contributes to this line of inquiry by exploring how different types of work autonomy favor the effective use of DDD, especially when DDD is used to promote innovation. Our study reports the findings of an ongoing research project that investigates the adoption of DDD among firms operating in Lombardy, one of the most industrialized and innovative Italian regions. Preliminary results suggest that firms adopting an innovation-oriented DDD are more likely to grant a higher level of strategic autonomy to their workers compared with firms adopting DDD for other goals, such as increasing efficiency.

Framing of the research. *Digital Transformation (DT) refers to a profound organizational change associated with the widespread use of digital technologies (Hanelt et al. 2021). A distinguishing aspect of DT is the increased availability and effective use of data, which can reshape decision-making processes. Traditionally, managers and workers relied on intuitions and gut feeling, but DT facilitates a shift toward a data-driven decision-making (DDD) approach, where real-time data is accessed and utilized for more informed decisions (Capo et al. 2022; Brynjolfsson and McElheran, 2016a). In this context, data can be used to identify emerging market trends, craft strategies, optimize operations, monitor financial performance, and drive innovation (Davenport et al., 2021). Ultimately, the adoption of a DDD approach can lead to significant improvements in firm performance (Sleep et al., 2022; Krafft et al., 2021; Davenport et al., 2021; Brynjolfsson and McElheran, 2016a).*

Several factors affect the rate of DDD adoption (Brynjolfsson and McElheran, 2016a; Sleep et al., 2022; Bar-Gill et al., 2024). First, firm size (both in terms of employment and belonging to a group) strongly predicts DDD, consistent with economies of scale. Second, ICT adoption is significantly associated with DDD, as it provides firms with the technical infrastructure needed to store and process data. Third, higher levels of formal education favor an effective use of data (Brynjolfsson and McElheran, 2016a) and affect the probability of adopting a DDD approach. Moreover, the adoption of structured management practices (e.g., performance-based monitoring, evaluation, compensation, and incentives) also affects a DDD approach (Brynjolfsson and McElheran, 2016a). Moreover, previous studies found evidence of complementarities between ICT, investments in human capital, and structured management practices (Brynjolfsson and McElheran, 2016b).

In addition to such potential complements, Sleep et al., 2022 suggest that the business knowledge perspective (i.e. IT or marketing oriented) may influence firm's DDD, with the IT-oriented perspective having a direct and positive effect on DDD and the marketing perspective none. Moreover, they find that the DDD approach enhances innovation and financial performance, highlighting the role of DDD in innovation-oriented firms.

The literature on DT has also discussed the role of workers' autonomy and decentralization of authority within organizations (Bloom et al., 2014; Dixon et al., 2021). Digital technologies can foster employee creativity, enable workers to solve a wide range of problems, and favor the implementation of new ideas (Oldham and Da Silva, 2015). Consequently, the adoption of IT can enhance workers' autonomy, leading to a more decentralized decision-making system (Bloom et al., 2014). At the same time, technologies such as robotics may reduce the need for managers to monitor

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workers' activities closely. However, depending on the tasks, robotics may require greater centralization or greater decentralization of decision-making authorities (Dixon et al. 2021); in particular, human resource-related decisions such as training are decentralized from managers to nonmanagerial employees, while the choice of production technology is centralized from managers to business owners and corporate headquarters. The existence of contrasting effects may also influence the relationship between DDD and the level of work autonomy. For example, Brynjolfsson and McElheran (2016b) conjecture that the "use of joint decision-making between managers and frontline workers could conceivably substitute for DDD" (p. 21). Nonetheless, they do not find any empirical evidence supporting such a negative correlation.

Given these complexities, it is crucial to further investigate whether DDD is associated with lower or higher levels of autonomy. This paper contributes to this discussion by presenting empirical evidence that underscore the importance of considering work autonomy as a multidimensional construct when assessing its relationship with the adoption of a DDD approach.

Purpose of the paper. *This study empirically investigates how different types and varying levels of work autonomy covary with the adoption of DDD, along with a few organizational factors like firm size (both employment and multi-unit business), business sectors, the level of employees' education, the endowment of ICTs. Our interest in work autonomy is motivated by its recognized importance in innovative and entrepreneurial activities. Autonomy, described as "the freedom granted to individuals and teams who can exercise their creativity and champion promising ideas" (Lumpkin and Dess 1996, p. 140), is a key dimension of entrepreneurial orientation, defined as "an approach to decision making that draws on entrepreneurial skills and capabilities" (Lumpkin et al. 2009: 48).*

Consistent with previous research (Bar-Gill et al., 2024; Brynjolfsson and McElheran, 2016a; Sleep et al., 2022), we conceptualize DDD as a multidimensional construct comprising four key dimensions: i) the availability of data to support decision making within the organization; ii) the extent to which the organization leverages the available data in the decision making process; iii) the extent to which the organization collects data on key performance indicators (KPIs); iv) the extent to which the organization uses the available data to pursue innovation activities. By combining these four dimensions, we define two distinct, yet interdependent, concepts of DDD: 1) DDD that supports decision-making across various functions of the firm (e.g., operations, finance, human resources); 2) DDD tailored to innovation activities.

The literature about job design and the entrepreneurship literature both describe autonomy as a multidimensional construct and distinguish structural autonomy from strategic or goal autonomy (Lumpkin et al. 2009). The former refers to discretion in the means of problem solving (e.g., work hours, work procedures, time to complete a task) within given resource constraints (Bailyn 1985). The latter reflects "the independent action of an individual or a team in bringing forth an idea or a vision and carrying it through to completion" (Lumpkin and Dess 1996, p. 140). This distinction is significant, as prior research suggests that structural autonomy is primarily linked with job satisfaction and reduces employees' incentive to leave their organization (Marvel et al. 2007), whereas a high level of strategic autonomy to be positively associated with strategic effectiveness (Haas 2010).

Building on this evidence, we explore whether the adoption of a DDD approach is associated with the granting of structural and strategic autonomy within organizations. This relationship may arise for at least two reasons. First, strategic autonomy enables individuals and teams to participate in higher-level decision-making, allowing them to explore business opportunities outside the established chain of command and current corporate strategy (Burgelman 1983). Second, firms that engage in explorative search to navigate rapid changes in their competitive environment often grant strategic autonomy to individual employees or teams (McGrath 2001). In both cases, strategic autonomy requires greater reliance on data availability and their extensive use to monitor the achievement of organization-wide objectives.

Methodology. *We conducted an original survey of firms located in the Lombardy region, Italy. The data collection was conducted between April and June 2024. The sample came from two sources. The first is based on a dataset of about 2,500 firms provided by the internship and job placement office of the University of Milano-Bicocca. The firms were contacted by the office with a link to the survey. The response rate was about 10% (about 250 responses). The second data source came from an independent poll company, which collected data through the CATI method on an initial sample of 1392 firms; 246 companies responded to the survey (with a response rate of 18%). We received complete responses from a total of 423 companies: due to missing values in some of the variables used in this analysis, the working sample comprises 324 observations. Survey data were matched with firm data from the AIDA business database. The survey covers a wide range of information regarding firm characteristics, labor force composition, data-related practices, ICT adoption, managerial and organizational practices, and economic and innovation performance. We construct two indicators of DDD. The first one (i.e., DDD-KPI) is designed following Brynjolfsson and McElheran (2016a, 2016b, 2019) and Bar-Gill et al. (2024) and builds on three components: availability of data to support decision-making, actual use of data for decision-making, and intensity of performance monitoring measured by the number of KPIs monitored.*

- *Availability of data goes from none=0 to complete availability=4. In our sample, 35% of firms reported a high or complete availability of data (responses in the top two categories).*
- *Use of data to make decisions goes from no=0 to complete=4. 32% of our sample use data heavily or entirely (responses in the top two categories).*
- *The use of key performance indicators (KPIs). Our index goes from 0 to 7. It represents the sum of the number of KPIs monitored by the firm - patents, time to market, productivity, client response time, customer satisfaction, profitability,*

and revenue growth rate. Overall, the mean value in our sample is 2.4 KPIs monitored. Only 13% of our sample firms monitor more than 5[5] KPIs.

The second indicator of DDD (i.e., DDD-innovation) is based on Sleep et al. (2022), which includes data availability and use of data, and the use of data for innovation activities:

- *Type of activity influenced by data analytics. We distinguished innovation activities (product innovation, process innovation, or organizational innovation) from operational activity (customer relationship management - CRM, and supply chain management - SCM). 61% of the sample uses data to perform innovation activities, whereas 41% use data for the CRM or the SMC. 28% of firms declare that they use data to perform both innovation and CRM/SCM activities.*

Based on the measures discussed above, we construct the two indicators of DDD, as follows. The DDD-KPI indicator is a categorical variable that ranges from 0 to 2, where 0 denotes firms which report low levels of availability of data (from 0 to 2), low levels of use of data (from 0 to 2), and those that report a number of KPI monitored below the median (i.e., 2). DDD-KPI takes the value of 2 when a firm reports a high level of data availability (top two categories), a high level of data use (top two categories), and a number of KPIs monitored greater than the median. For all the intermediate cases, DDD-KPI takes the value of 1. Overall, 22.53% of the respondents are classified in the maximum level of DDD-KPI indicator, while 26.54% falls in the lowest one. The remaining 50.93% of observations accrue to the intermediate category.

Similarly, DDD-innovation is a categorical variable that goes from 0 to 2, where 0 denotes firms which report low levels of data availability (from 0 to 2), low levels of data use (from 0 to 2), and those firms that do not use data to perform any innovation activities. DDD-innovation takes the value of 2 when a firm reports high level of data availability (top two categories), high level of use of data (top two categories), and those that use data to perform any innovation activities. For all the intermediate cases, DDD-innovation takes the value of 1. Overall, 26.23% of firms are classified in the maximum level of DDD-innovation indicator, while 19.75% falls in the lowest one. The remaining 54.01% of observations accrue to the intermediate category.

We first focus on factors related to DDD that were considered relevant in previous empirical studies, namely firm size (employment and multi-unit establishment), sector, human capital, and ICT adoption. To assess possible economies of scale in adoption, we distinguish between micro and small enterprises (less than 50 employees), medium-sized enterprises (less than 250 employees) and large firms. We also consider whether the firm is part of a group or not, as measure of size. The firms belong to 9 economic sectors (ATECO letters): manufacturing, other industries, commerce, transport, tourism, business services (ICT and scientific activities), business services (others), credit and insurance, others sectors. Since the effective use of data may depend on higher levels of formal education, we also consider the level of human capital proxied by the percentage of employees with a bachelor's degree or higher. Finally, the ICT index is the sum of the following eleven types of ICT services and applications adopted: internet use, company web site, use of social networks, multimedia sharing platforms, e-Commerce, Enterprise Resource Planning, Customer Relationship Management, Data Lake, Data analytics, Cloud Computing Services, and AI.

To inspect whether a decentralization system (higher level of workers autonomy) plays a role in DDD adoption, we distinguish structural autonomy from strategic autonomy. Based on 5 items of a survey question, employees' structural autonomy captures the degree of autonomy in planning and performing the work, whereas strategic autonomy captures the degree of autonomy in taking decisions, participating in the decision-making process, and defining job tasks. Each item ranges from 0 (never) to 4 (always), and the two variables are computed as the average values of items. The sample level of structural autonomy is 2.48, whereas that of strategic autonomy is 2.09.

Results. *Tables 1-3 shows the cross-tabulation of the two DDD indicators with size in terms of employment, whether they are single or multi-unit establishments, and sector, respectively, while tables 4-5 present the summary statistics of human capital, ICT and autonomy by each level of the DDD indicators. In terms of size (tab. 1), the rate of the highest level of DDD adoption (value equals 2) increases with firm size in both indicators, confirming previous evidence regarding the importance of economies of scale in the DDD adoption. Tab. 2 shows the distribution for single firm (single unit) and firms belong to a group (multi-unit). Coherent with size, also belonging to a larger group is correlated to higher level of DDD, in both indicators. With regard to sectors (tab. 3), the rate of the highest level of DDD adoption vary across subdivisions, with commerce, business services (ICT and scientific activities) and credit and insurance with the higher percentage of DDD firms in both indicators. In particular, firms in credit and insurance shows the highest percentage, both when we consider the DDD-KPI indicator (i.e. 46.5%) and the DDD-innovation indicator (i.e. 65.38%). This aligns with the fact that this sector has long been at the forefront of data utilization and modeling (e.g. for credit risk assessment).*

Tab. 4 (left-side) shows that firms in the highest category of the DDD indicators have a greater percentage of university-degree workers (58% for DDD-KPI and 56% for DDD-innovation), as expected. Tab. 4 (right-side) shows that the average number of ICT adopted when firms are in the highest category of the DDD indicators is more than 6, which is the highest mean among the three possible levels for both indicators.

[5] 5 KPI monitored is the threshold used by Brynjolfsson and McElheran (2016) and by Bar-Gill et al. (2024).

Tab. 1: DDD indicators by size

	DDD-KPI				DDD-innovation			
Size	0	1	2	Total	0	1	2	Total
Micro and small enterprises (<50 employees)	65 32.18	112 55.45	25 12.38	202 100.00	47 23.27	124 61.39	31 15.35	202 100.00
Medium-sized enterprises (50 to 249 employees)	18 25.35	31 43.66	22 30.99	71 100.00	13 18.31	31 43.66	27 38.03	71 100.00
Large enterprises (>249 employees)	3.00 5.88	22 43.14	26 50.98	51 100.00	4.00 7.84	20 39.22	27 52.94	51 100.00
Total	86 26.54	165 50.93	73 22.53	324 100.00	64 19.75	175 54.01	85 26.23	324 100.00

Source: our elaboration

The first row shows the frequency, the second one is the percentage

Tab. 2: DDD indicators by number of units

	DDD-KPI				DDD-innovation			
	0	1	2	Total	0	1	2	Total
Single unit	71 32.13	111 50.23	39 17.65	221 100.00	53 23.98	123 55.66	45 20.36	221 100.00
Multi-unit	15 14.56	54 52.43	34 33.01	103 100.00	11 10.68	52 50.49	40 38.83	103 100.00
Total	86 26.54	165 50.93	73 22.53	324 100.00	64 19.75	175 54.01	85 26.23	324 100.00

Source: our elaboration

The first row shows the frequency, the second one is the percentage

Tab. 3: DDD indicators by sectors

	DDD-KPI				DDD-innovation			
Sector	0	1	2	Total	0	1	2	Total
Manufacturing	27 36.99	35 47.95	11 15.07	73 100.00	17 23.29	43 58.90	13 17.81	73 100.00
Other industries	2 15.38	10.00 76.92	1 7.69	13 100.00	3 23.08	8 62.54	2 15.38	13 100.00
Commerce	9 32.14	9 32.14	10 35.71	28 100.00	8 28.57	11 39.29	9 32.14	28 100.00
Transport	7 36.84	8 42.11	4.00 21.05	19 100.00	3 15.79	13 68.42	3 15.79	19 100.00
Tourism	7.00 28.00	17 68.00	1.00 4.00	25 100.00	3 12.00	21 84.00	1 4.00	25 100.00
Business services (ICT & Scientific activities)	15 17.65	44 51.76	26 30.59	85 100.00	14 16.47	41 48.24	30 35.29	85 100.00
Business services (other)	8 30.77	12 46.15	6 23.08	26 100.00	7 26.92	12 46.15	7 26.92	26 100.00
Credit and insurance	2 7.69	12 46.15	12 46.15	26 100.00	1 3.85	8 30.77	17 65.38	26 100.00
Other sectors	9 31.03	18 62.07	2.00 6.90	29 100.00	8 27.59	18 62.07	3 10.34	29 100.00
Total	86 26.54	165 50.93	73 22.53	324 100.00	64 19.75	175 54.01	85 26.23	324 100.00

Source: our elaboration

The first row shows the frequency, the second one is the percentage

Tab. 4: DDD indicators by human capital and ICT index

		Human Capital				ICT			
DDD-KPI	Freq.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
0	86	28.48	32.55	0	100	3.03	1.72	1	7
1	163	44.95	33.84	0	100	4.80	2.44	1	11
2	70	58.40	31.39	0	100	6.70	2.25	2	11
Total	319	43.46	34.51	0	100	4.76	2.56	1	11
DDD-innovation	Freq.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
0	64	40.89	36.73	0	100	3.86	2.53	1	11
1	173	38.73	34.23	0	100	4.31	2.26	1	10
2	82	55.45	30.66	0	100	6.36	2.51	1	11
Total	319	43.46	34.51	0	100	4.76	2.56	1	11

Source: our elaboration

Tab. 5: DDD indicators by structural and strategic autonomy

		Structural autonomy				Strategic autonomy			
DDD-KPI	Freq.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
0	86	2.32	0.88	0	4	1.86	0.88	0.00	4
1	165	2.62	0.94	0	4	2.15	0.73	0.00	4
2	73	3.03	0.82	1	4	2.52	0.76	0.67	4
Total	324	2.63	0.93	0	4	2.16	0.81	0.00	4
DDD-Innovation	Freq.	Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
0	64	2.55	0.90	0	4	1.85	0.87	0.00	4
1	175	2.49	0.98	0	4	2.07	0.78	0.00	4
2	85	2.98	0.77	1	4	2.55	0.68	0.67	4
Total	324	2.63	0.93	0	4	2.16	0.81	0.00	4

Source: our elaboration

Tab. 5 shows preliminary and descriptive results concerning the role of workers' autonomy regarding DDD. We distinguish between structural and strategic autonomy. On the one hand, structural autonomy allows employees to manage their work within well-defined tasks. On the other hand, strategic autonomy allows agents to enter and to participate in the corporate decision-making process. As shown in Tab. 5, the average value of both structural and strategic autonomy is the highest for level 2 of DDD, confirming that the most advanced approach to decision-making is correlated to larger workers' autonomy. In addition, we can note when moving from the lowest to the highest category of DDD, the growth rate of strategic autonomy is higher than the growth rate of structural autonomy for both indicators. Indeed, it is notable in the case of DDD-innovation, i.e. 17% for structural autonomy and 37.8% for strategic autonomy. When moving from the lowest to the highest category of the DDD-KPI, the difference in the growth rate of strategic and structural autonomy is less sharp (35.5% versus 30.5%). This suggests that strategic autonomy is particularly important to a decision-making process oriented to innovation.

Research limitations. *We identify some potential limitations of the study. First, since the investigation is on going, the current study provides only a very preliminary and descriptive analysis, which prevents from establishing multiple influencing factors and quantifying relations. In addition, the analysis considers few factors related to DDD, but other important elements could be relevant, such as manager/employee trust, work satisfaction, and employee motivation that could affect innovation and performance in a DDD firm. Second, the research is based on cross-sectional data, making difficult to identify possible lagged relations or dynamics. The preliminary analysis indicates that using DDD to manage innovation activities is associated to a greater growth rate of strategic autonomy compared with the growth rate of structural autonomy. This result suggests a correlation between DDD used to innovation activities and a decentralization of the decision-making. To determine the direction of this association is difficult to establish with the current setting. It can be the case that digital technologies used to promote innovation can stimulate the adoption of more autonomy-oriented managerial practices, or can be the case that in a more decentralised system the costs to implement a DDD approach is lower, since the workforce reports higher level of competences and abilities in comparison to system characterized by a more hierarchical structure of decision-making. Further investigation is needed to inspect causality. Third, the data concerns firms located in Lombardy, which limits the generality of our results. Future studies could collect data from firms located in Italy or even in other countries to identify relevant differences affecting the findings.*

Managerial implication. *This study benefits managers in several ways. First, we find evidence of the difference in the rate of DDD adoption between large and small firms, and across economic sectors. This result indicates a possible long-term implication for the capacity of small firms and certain sector to adapt to the DT. Managers of these firms have to be aware of the importance of co-factors of DDD in order to promote the development of a data-driven approach. Second, our results indicate that organizations using a DDD approach to promote innovative activities may invest in a more decentralization decision-making. This implies modifying managerial practices leading to higher workers strategic autonomy. Indeed, the mere access to data is not enough to extract economic value. Managerial and organizational capabilities and changes are needed to translate information into innovative business strategies (Ciampi et al., 2021). Our study wants to enrich the existing knowledge on managerial and organizational changes needed to proper manage DDD.*

Originality of the paper. *The current study contributes to the existing evidence in several ways. First, we collect new and original data. Therefore, we can confirm the existing evidence on DDD phenomenon by using a primary data from firms located in Lombardy, region of Italy. The data collected cover a wide range of information, allowing us to control for a great number of features. Our findings suggest the importance of firm- and industries-specific factors that contributes to better understanding the adoption of DDD.*

Second, previous researches have examined the relationships between DDD and structured managerial practices (Capo et al. 2022; Brynjolfsson and McElheran, 2016a), others have proved the positive effect of DDD on innovation and firm's performance (Krafft et al., 2021; Davenport et al., 2021; Brynjolfsson and McElheran, 2016a); the most have indicated potential co-factors related to DDD (Capo et al. 2022; Brynjolfsson and McElheran, 2016a). However, they have not specially examined all these relationships considering different business knowledge perspective, nor they have addressed the role of workers' autonomy. To address this gap, our study investigates the role of workers' autonomy

considering separately DDD innovation-oriented from more general DDD. As expected, the role of workers' strategic autonomy seems to be central in predict DDD approach under innovation perspective.

Key words*: Digital Transformation; Data-Driven Decision-Making; Strategic Autonomy; Information and Communication Technologies*

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Medical Doctors' Entrepreneurial Intention Through Organizational Support to Innovation and Collaboration Propensity

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Abstract

Building on the Theory of Planned Behavior (TPB) and the Theory of Reasoned Action (TRA), this paper examines the relationship between medical doctors' (MDs) entrepreneurial attitudes (EA) and their entrepreneurial intention (EI). Based on a sample of MDs involved in the G-STeP project at the research-led "Agostino Gemelli" hospital in Rome, results show that MDs' attitude toward entrepreneurship positively drives their intentions to enterprise. Such an effect is explained by the MDs' perception of support to innovation within the organization. However, such an effect is moderated by MDs' propensity to collaborate. Thus, for higher levels of MDs' collaboration propensity the effect is magnified. This means that, for MDs that show high levels collaboration propensity, the perceived role of organizational support for innovation is more important than their individual EA to explain potential EI. Specifically, at low levels of MDs' collaboration propensity, there is a negative effect on EI. These findings underline the need for an individual collaborative attitude alongside the presence of an organizational culture that supports innovation to foster entrepreneurship among MDs in a research-led hospital.

Keywords: *medical doctors;* entrepreneurship*; innovation;* entrepreneurial intention*; organizational support to innovation;* collaboration propensity

Framing the research. *Entrepreneurship is becoming increasingly relevant in healthcare, as medical doctors (MDs) are expected to engage in innovation-driven initiatives to improve service delivery, patients' outcomes, and organizational efficiency (Battle et al., 2022; Lega et al., 2013). However, the transition from patients' care centricity to entrepreneurship remains underexplored. While prior research on entrepreneurial behavior emphasizes the role of individual differences (e.g., personality traits, beliefs, and predispositions) (Covin et al., 2020) and organizational ecosystems (Carlos & Hiatt, 2022), little attention has been paid to how these factors interact in a healthcare setting usually characterized by goals different from enterprises.*

Previous literature acknowledges the role of organizational culture oriented to innovation as a key determinant of entrepreneurial action, influencing how professionals perceive autonomy, risk, shaping their attitudes within their workplace (Bhatti et al., 2020; Schein, 2010). A culture that fosters autonomy and initiative may serve as a critical enabler of entrepreneurial behavior especially when dealing with innovations (Ahmetoglu et al., 2018). When MDs operate in an environment that values innovation and intrapreneurship, they are more likely to translate their attitudes into concrete initiatives (Sabherwal & Jeyaraj, 2015). Coherently, recent research conducted in an academic intrapreneurship (precisely, an University Medical Centre similar to the one we used as a research setting), shed light – among the other, e.g., external collaborations, time availability, and so on - the critical on the role of organizational support for MDs in fostering innovative entrepreneurship as key enabler of innovation (Burkholder & Hulsink, 2022).

Organizational culture often influences entrepreneurial behavior indirectly, by shaping perceptions of innovation support-that is, the degree to which medical professionals feel encouraged to develop and implement new ideas (Rosenbusch et al., 2011). Previous research suggests that organizations with strong innovation policies are more likely to stimulate entrepreneurial activity, encouraging innovation strategies (Sestino, Gastaldi & Leoni, 2024). In healthcare, this could translate into providing MDs with resources, training, and structural support measures that facilitate entrepreneurial actions.

Despite the positive role of organizational support to innovation, its effects on entrepreneurial intention could be influenced by MDs' individual characteristics, such as innovation tendency, openness to change and further personality traits (Marcati et al., 2008). Individual difference related to MDs' collaboration propensity, for example, could drive the development of entrepreneurial solutions thanks to the possibility MDs have to leverage on social capital from a professional network (Caprara et al., 2012) that brings benefits from peer knowledge, collective problem-solving and shared risk-taking to the table of new entrepreneurial initiatives (Ketchen et al., 2007). This could be particularly interesting for healthcare settings where the "core" of the activities focusses on patients' care rather than

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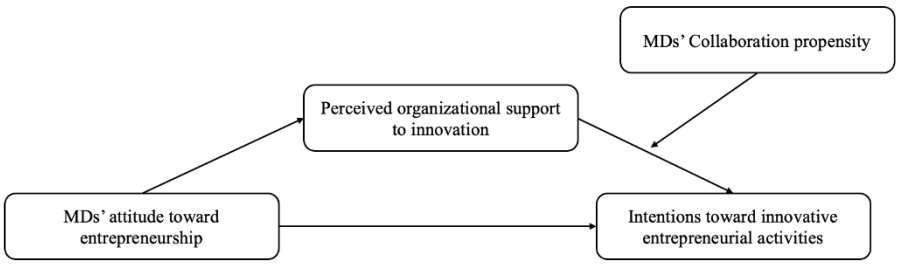
entrepreneurship. Research on opportunity exploitation suggests that individuals with lower collaborative tendencies often struggle to transform innovative ideas into actionable business opportunities, as they lack the social reinforcement needed to navigate complex organizational and regulatory environments (Dacin et al., 2011). This is particularly relevant in healthcare, where entrepreneurial initiatives require multidisciplinary coordination, access to institutional networks, and regulatory compliance (Wildenet al., 2018).

Purpose of the paper. *Building on the Theory of Planned Behavior (TPB) and the Theory of Reasoned Action (TRA), this study examines the mechanisms through which MDs' entrepreneurial attitudes shape intentions in a healthcare corporate entrepreneurship setting such as that of the* the G-STeP project at the "Agostino Gemelli" research-led hospital in Rome. *By integrating theoretical insights from organizational behavior, innovation management, and healthcare entrepreneurship literature, we developed three hypotheses. First, we predict that MDs' entrepreneurial attitude positively influences their behavioral intention. Second, we propose that such an effect is explained (mediated) by their perceived organizational support to innovation. Third, we predict that such an effect is moderated by individual MDs' higher (vs. lower) collaboration propensity.*

In line with TRA, where intentions are shaped by individual beliefs, we suggest that an organization's commitment to fostering innovation and collaboration significantly enhances the translation of entrepreneurial attitudes into intentions, and in turn on real actions (behaviours).

Fig. 1: Proposed framework



Methodology. *Based on the above* we predict, *this study employs a survey-based experimental design to investigate how entrepreneurial attitudes (X) influence entrepreneurial intention (Y) among MDs, considering the mediating roles of the perceived support to innovation from the organization (Me), and the moderating role of MDs' collaboration propensity (Mo).*

Participants were medical doctors working in a research-led hospital, and working on a specific project called "Gemelli Science and Technology Park" (hereafter, G-STeP) that is aimed at building a research infrastructure at Policlinico Universitario Agostino Gemelli IRCCS, providing cutting-edge technological services through over 20 Core Facilities. It supports scientific projects by offering advanced data analysis, AI solutions, and innovation-driven research tools. 180 MDs were asked to complete a self-reported questionnaire assessing their entrepreneurial attitudes, perceived organizational culture, innovation support, and entrepreneurial intention. In total, 72 MDs completed the survey, but 69 responses were retained for analysis after data cleaning (because of incomplete responses).

Prior to assessing their entrepreneurial intention, participants responded to validated measures of their collaboration-seeking behavior, hypothesized as a moderator, assessed through items adapted from Caprara et colleagues (2012) (e.g., "I actively seek opportunities to collaborate with colleagues", "Working in a team enhances my ability to innovate"). Then, we asked them to assess entrepreneurial attitude and perceived support to innovation, drawn from previous studies. The measurement items for entrepreneurial attitude were adapted from Covin et al. (2020) (e.g., "I have a positive attitude toward starting new ventures", "I consider entrepreneurship as a viable career path"). The perceived organizational support to innovation has been measured by using items from Sabherwal & Jeyaraj (2015) (e.g., "My organization provides adequate training for digital transformation", "Adopting new technologies is a priority for my organization"). After completing these sections, participants were asked to rate their entrepreneurial intention, measured using items from Ajzen & Fishbein (2000) (e.g., "I intend to develop new projects within my organization", "I plan to take a leadership role in innovative initiatives"). All responses were collected using a 5-point Likert scale (1 = "Strongly Disagree" to 5 = "Strongly Agree"). Socio-demographic variables (e.g., age, gender, specialization, income level) were recorded to account for potential covariates in the analysis.

Results. *The analysis has been conducted by employing the moderated mediation model (Model 14) of the SPSS Macro Process (Hayes, 2018) to assess the relationships between attitudes toward entrepreneurship (EA) settled as the independent variable X, perceived support to innovation acting as a mediator Me, MDs' collaboration propensity acting as a moderator (mean-centered), and entrepreneurial intentions (EI), as the dependent final variable Y.*

Results of our statistical analysis indicate that EA has a significant direct effect on EI among medical doctors (b = 0.334, p = 0.013). Moreover, EA positively influences the perception MDs have of the organizational support to innovation (b = 0.296, p = 0.040). The perceived support to innovation also positively affects EI (b = 1.056, p = 0.0146), confirming that the perception of organizational support for innovation explains medical doctors' EI.

MDs' collaboration propensity significantly moderates this relationship (b = 0.269, p = 0.011), with a higher level of collaboration strengthening the positive impact of organizational support to innovation on EI. By closely looking at this

interaction, such an overall effect is neutral at lower levels of MD's collaboration propensity because the effect is non-significant. Importantly, it starts to become significant and positive at higher levels of collaboration propensity (b= .223; p= .006). Overall, these findings suggest that MDs with an entrepreneurial mindset are more likely to engage in entrepreneurial activities, especially when they perceive organizational support for innovation. However, this effect is stronger when MDs have a high propensity to collaborate, as collaboration enhances the positive impact of perceived innovation support on entrepreneurial intentions.

Originality of the paper. *This study offers a novel perspective on MDs' entrepreneurship, challenging the assumption that individual attitudes alone foster entrepreneurial intention. While prior research highlights the role of organizational culture and innovation support in shaping entrepreneurial behavior, little attention has been given to how these factors interact within healthcare settings. By demonstrating that, beside organizational innovation support, collaboration-seeking behavior plays a crucial moderating role (aligning with Yoda, 2015), this paper provides fresh insights into why some MDs can translate their entrepreneurial attitudes into action while others do not. The findings contribute to a better comprehension of entrepreneurship in healthcare, emphasizing that organizational innovation efforts find in MDs with a strong collaborative propensity an effective vehicle for entrepreneurship. Findings from our study must be interpreted in the light of the peculiar research context (i.e., in a clinical, hospital setting) where the focus is by nature on patients' care. In this setting, "non-core-business" initiatives may be encouraged and supported by the organization. However, the level of MDs' collaboration propensity may result of key importance in explaining entrepreneurial intention. We believe that this is due to the fact that, in their normal course of activities, MDs are accustomed to leveraging a wide professional network (Caprara et al., 2012) to peer knowledge, collective problem-solving and shared risk-taking (Ketchen et al., 2007). They are particularly relevant in entrepreneurship as well. Therefore, despite the MDs' primary focus would remain on patients' care, their acknowledgement of social capital reported in their collaborative propensity is an important asset for giving birth to entrepreneurial ventures.*

Managerial implications. *Healthcare organizations aiming to foster entrepreneurial engagement among MDs must go beyond the simple attitude measures and acknowledge the unique setting where patient care remains the primary focus. Results of our on-field study suggest that MDs' perceived organizational support to innovation, and collaboration-seeking propensity are crucial in determining whether MDs translate their entrepreneurial attitudes into concrete initiatives. Important managerial implications emerge from this research. First, in a research-led hospital aiming at developing an entrepreneurial culture, fostering a collaborative work environment should be prioritized over simply providing resources. Medical doctors operate in highly specialized and organized structures where decision-making is often fragmented across departments. In such an environment, even when financial or technological resources are available, they may not be enough to drive entrepreneurial action. Doctors tend to rely on team-based collaboration, experience and perspectives sharing, and interdisciplinary support rather than on individual incentives. To enhance entrepreneurship, hospitals and research institutions should facilitate cross-functional interaction between medical doctors, healthcare managers, and technology experts. Encouraging structured initiatives such as innovation teams, joint problem-solving workshops, and mentorship networks can create an ecosystem where entrepreneurial ideas can emerge and be sustained over time. Second, organizations must redefine how innovation support is structured in a healthcare corporate setting. Unlike other industries, where access to funding, technology, and training may directly enhance entrepreneurial outcomes, in healthcare, the role of collaboration is even more critical. Medical doctors with a low openness to collaboration, may not fully utilize available innovation resources, whereas those who actively engage in team-based initiatives are more likely to leverage organizational support for new ventures. A more context-sensitive approach to innovation support is needed-one that prioritizes co-creation spaces, cross-disciplinary research units, and team-based innovation challenges over individualized incentives. Hospitals should integrate structured interprofessional collaborations, where specialists from different fields work together on innovation projects, ensuring that new ideas are not just conceptualized but also implemented effectively.*

Research limitations. *This study is not exempt from some limitations that should be acknowledged. Since the data collection has been conducted by leveraging on medical doctors' participating at the G-STeP project at the research-led "Agostino Gemelli" hospital in Rome, the sample size is relatively small, with data collected from only 69 medical doctors. This may limit the generalizability of the findings. Moreover, while the study explores the moderating role of collaboration propensity, it does not account for other potential individual or contextual factors (e.g., risk aversion, leadership support, or regulatory constraints) that may also influence entrepreneurial intentions, and thus further development should include such factors as well. Finally, the study focuses on a specific healthcare context, that since its peculiarities, and by considering the gap in the current literature has been chosen as a research setting. However, in such a setting where entrepreneurship may not be the primary professional objective of medical doctors, making it necessary to interpret results within this specific professional and organizational setting.*

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Retrovation for Sustainability: a Categorization with Cases from the Agrofood Industry

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Abstract

Retrovation, or retro-innovation, refers to the revival and reinterpretation of historical practices, products, and technologies which lead to a proper innovation. Rather than mere replication, retrovation requires a critical infusion of innovation to adapt past elements to modern needs and challenges. This paper explores the concept of retrovation within the agrofood industry, highlighting its potential as a sustainability-driven innovation strategy. Despite its conceptual relevance, retrovation remains underexplored in academic literature and lacks a systematic framework for its application. Through an extensive literature review, on the one hand, this study presents the state of the art of this concept; on the other hand, it proposes a categorization of retrovation into three types working on cases from the agrifood industry: (1) innovative use of historical materials and machinery, (2) innovation of past techniques, and (3) innovative adoption of past techniques. Case studies-including the reintroduction of ancient grains, modernization of traditional food processing methods, and optimization of historical winemaking techniques-demonstrate how retrovation fosters sustainability by integrating past knowledge with contemporary advancements. The findings emphasize the role of retrovation in sustainable innovation, in entrepreneurial opportunity, and in policy development. This study provides a structured framework for retrovation and offers managerial insights for industries seeking to merge tradition with modern sustainability goals, by means of innovation.

Framing of the research. *The concept of retrovation, also known as retro-innovation, has gained some attention in recent years as an alternative innovation paradigm that integrates historical knowledge with contemporary advancements (Suominen & Sivula, 2016; Sedita, 2024). Retrovation focuses on reviving and reinterpreting forgotten practices, products, ideas, and technologies that have experienced disruption or discontinuity over time. However, rather than mere replication, retrovation requires a critical infusion of innovation to adapt past elements to modern needs and challenges (Stuiver, 2006). By drawing upon different typologies of knowledge rooted in the past, retrovation offers original and potentially transformative solutions to contemporary problems.*

In the current global discourse on sustainability, retrovation presents an intriguing opportunity. Many historical practices and products were inherently sustainable, often due to constraints on resources or reliance on local economies and traditions (Crespi Gomes et al., 2025). However, despite its conceptual potential, retrovation remains largely underexplored in both academic literature and practical applications. While prior studies have broadly discussed retrovation (Greidanus, 2022), there is a notable absence of a systematic framework that categorizes its application, particularly within the context of sustainability. This gap in structured understanding limits the potential for practical implementation and scalability.

Retrovation represents a fusion of past and present, where historical knowledge and traditional practices are revitalized to meet contemporary challenges. This concept spans multiple domains, from agriculture to business models, fostering sustainability, resilience, and efficiency. Theoretical perspectives on retrovation have evolved over time, with Zagata et al. (2020) conceptualizing it as the mobilization of historical knowledge for modern problem-solving. Suddaby and Laasch (2020) explore its role in ethical management, arguing that re-engaging with past practices can lead to responsible business solutions. Greidanus (2022) builds on these insights by proposing a theoretical model linking retro-innovation to contemporary innovation strategies.

The agrofood industry provides an exemplary case for examining retrovation due to its deep-rooted connection with both tradition and innovation (Zagata et al., 2020). By analyzing historical food production methods, processing techniques, and material usage, retrovation can provide a structured framework for sustainable innovation. Agriculture has been a key arena for retrovation, where traditional techniques are being reimagined for sustainability. Stuiver (2006) explores how historical farming methods can challenge existing agricultural paradigms. Kilis et al. (2022) investigate farmer-led retrovation in Latvia, with a focus on biological pest control and direct marketing strategies. González and Picazo (2024) highlight the role of retrovation in sustaining agropecuary farms in the Extremaduran Dehesa. León-Bravo

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et al. (2019) differentiate between retro and forward-looking innovations in the food industry, underscoring their significance in improving food quality and sustainability. Svensson et al. (2023) further examine how alternative food production methods contribute to preserving biocultural heritage. Retrovation has emerged as a strategic tool in sustainable development and business models. Sedita (2024) links retrovation to responsible innovation, emphasizing its role in addressing global challenges. Garre (2022) provides a case study on small-scale organic farming in Northern Italy, demonstrating how draft animal farming can be a sustainable retrovation. Gomes et al. (2025) explore the application of retrovation in circular economy practices within the apparel industry.

Beyond agriculture, retrovation is reshaping consumer products and industrial practices. For example, Olšiaková (2020) examines consumer preferences for retroinnovative wood products, suggesting a growing market interest in sustainable and traditionally inspired goods. Arrese (2016) discusses the reintroduction of paywalls in journalism as a business strategy rooted in retrovation. Liopa-Tsakalidi (2025) explores biodynamic agriculture, where traditional farming wisdom is integrated with modern smart technologies to enhance sustainability. Thus, retrovation presents a compelling approach to innovation, offering a bridge between tradition and modernity. Its relevance spans agriculture, sustainability, business, and consumer markets, providing valuable insights for industries seeking sustainable and historically informed solutions.

Purpose of the paper. *Despite its conceptual potential, retrovation remains largely underexplored in both academic literature and practical applications. While prior studies have broadly discussed retrovation (Greidanus, 2022), there is a notable absence of a systematic framework that categorizes its application, particularly within the context of sustainability. This gap in structured understanding limits the potential for practical implementation and scalability. This paper seeks to address the existing gap in research by proposing a systematic categorization of retrovation and demonstrating its practical applications within the agrofood industry. After having conducted an extensive literature review to establish the state of the art on the concept of retrovation, and to identify critical gaps in the literature, the main purpose of the paper is to propose a categorization of retrovation based on its functions within the agrofood sector. Rather than preemptively defining these categories, the study will develop them through an in-depth analysis of how retrovation manifests in different contexts, illustrating the innovative adaptation of historical practices and materials for contemporary sustainability challenges.*

The agrofood industry provides an exemplary case for examining retrovation due to its deep-rooted connection with both tradition and innovation (Zagata et al., 2020). By analyzing historical food production methods, processing techniques, and material usage, retrovation can provide a structured framework for sustainable innovation and development.

The literature review process is structured in two phases. First, a systematic search is conducted in ISI Web of Knowledge using the keywords "retrovation" and "retro-innovation". However, recognizing that retrovation remains an emerging concept and is not always explicitly labeled as such, the second phase expands the scope by identifying relevant cases within the agrofood sector. Some scholarly works may describe instances of retrovation without using the term explicitly, particularly in discussions on sustainability, traditional practices, and the revival of historical methods in modern food production. To address this limitation, the study adopts an inclusive approach, analyzing cases that align with the conceptual framework of retrovation, even if they do not explicitly reference the term.

Following this literature review, the study identifies functional categories of retrovation based on patterns observed in its application within the agrofood sector. By systematically analyzing how historical knowledge and traditional methods are reintegrated into contemporary agricultural and food production systems, the study derives an evidence-based categorization framework (and a set of related practical examples). This categorization enables a structured understanding of retrovation's role in innovation, highlighting how past practices are selectively reintroduced and adapted to address modern sustainability challenges.

Results. *Retrovation manifests in various ways, including the innovative reuse of historical materials and machinery, the modern adaptation of traditional techniques, and the re-exploration of past methods for contemporary applications. Specifically, three main categories emerged:*

Reviving Historical Materials and Machinery through Innovation. One of the most significant aspects of retrovation is the resurgence of traditional materials, now cultivated and processed using cutting-edge technologies. The food and agriculture sectors provide compelling examples of this trend. Ancient grains, which once formed the backbone of historical diets, have been reintroduced into modern agricultural systems. Crops such as einkorn, emmer, and spelt, historically cultivated for their resilience and nutritional properties, have regained popularity due to their health benefits and ability to thrive in sustainable farming practices (Guerrini, 2019). Through advanced genomic selection techniques, scientists and agronomists have improved their yield and resistance, making these heritage grains viable for large-scale production. Similarly, historical machinery has been revived and enhanced to integrate modern precision and efficiency. Traditional forked kneading machines, once a staple of artisanal bread-making, have been adapted with automated process control systems to maintain consistency while preserving the unique textural qualities of historical bread formulations (Parenti et al., 2013). This fusion of old and new ensures that time-honored culinary practices remain relevant in industrial food production. A parallel movement can be observed in viticulture, where forgotten grape varieties, once overshadowed by commercially dominant breeds, are being rediscovered. These historical grape strains offer unique organoleptic properties and greater resilience to climate change, making them invaluable in contemporary winemaking. Advanced microvinification techniques now allow winemakers to experiment with small batches of these rare grapes, reintroducing flavors that had nearly disappeared from the market (Allegro et al., 2023).

Modernizing Traditional Techniques. Beyond materials and machinery, retrovation thrives in the refinement of historical food processing techniques. A prime example is the adaptation of the alveograph technique, originally developed to measure gluten strength in wheat flour. While this method remains a cornerstone of baking science, modern technology has introduced automated solutions that enhance scalability, reduce human error, and provide real-time quality control feedback (Cappelli et al., 2018). This allows large-scale bakeries to maintain artisanal quality while meeting industrial demands. Artisanal cheese-making has also inspired technological advancements. Historically, cheesemakers relied on sensory experience-touch, smell, and taste-to determine when curds were ready for the next processing stage. Today, biosensors and spectroscopic analysis can replicate these intuitive judgments with greater precision, ensuring consistency while preserving traditional production methods. These innovations ensure that the nuances of terroir and traditional craftsmanship remain integral to the final product, even as production scales up.

Reinventing Historical Methods for Contemporary Applications. Retrovation does not merely involve preserving the past; it also includes reinterpreting and optimizing old methods for modern needs. The Governo all'uso toscano (GUT) winemaking technique, a Tuscan method that predates modern fermentation control, has seen a resurgence thanks to biotechnological advancements. This process, which involves adding dried grapes to fermenting wine to enhance flavor and stability, has been revisited with improved microbial control strategies and fermentation modeling, allowing winemakers to harness its benefits while maintaining quality consistency (Guerrini et al., 2020). Similarly, the rediscovery of ancient fermentation techniques has led to breakthroughs in sustainable food production. Historical preservation methods, such as lacto-fermentation, were once used primarily for food storage but are now being studied for their probiotic benefits and potential role in reducing food waste. By applying controlled environmental conditions and advanced microbial profiling, food scientists are optimizing these traditional methods to enhance both nutrition and sustainability in modern diets.

Retrovation exemplifies the balance between cultural preservation and technological progress. By breathing new life into historical materials, machinery, and techniques, industries can create innovative, sustainable, and high-quality products that honor the past while addressing the demands of the present. As technology continues to evolve, the practice of retrovation will likely expand beyond food and winemaking into other domains, including textiles, construction, and medicine, proving that sometimes, looking backward is the best way to move forward.

Research limitations. *While this study provides valuable insights into retrovation and its applications, it has some limitations. First, the analysis is primarily qualitative, and further quantitative research is needed to assess the economic and environmental impact of retrovation. Second, the study focuses on the agrofood industry, limiting its generalizability to other sectors. Future research should explore retrovation in industries such as fashion, construction, and manufacturing. Third, the cases analyzed are regionally specific, and broader cross-cultural studies could offer a more comprehensive understanding of retrovation's global potential.*

Originality of the paper. *This paper makes several original contributions to the study of retrovation and its intersection with sustainability and innovation. First, it develops a structured framework that systematically categorizes retrovation, providing a much-needed theoretical foundation for understanding its diverse applications. While previous studies have acknowledged retrovation as an emerging phenomenon, there has been a lack of a clear and organized classification that highlights its different forms and functionalities. By addressing this gap, this study not only enhances conceptual clarity but also facilitates a more structured analysis of how historical knowledge and traditional methods can be leveraged for modern problem-solving.*

Another key contribution of this paper is its empirical foundation, which is built upon the identification of real-world cases from the agrofood sector. Through a rigorous examination of the ways in which historical agricultural and food production practices have been reintegrated into contemporary sustainability strategies, this research sheds light on the mechanisms that drive retrovation in practice. These case studies provide concrete examples of how retro-innovative approaches have been successfully implemented, demonstrating their viability and scalability in addressing pressing environmental and economic challenges. Unlike general discussions on sustainability and heritage-based innovation, this study systematically links retrovation to practical applications, offering valuable insights for businesses, policymakers, and sustainability practitioners.

Furthermore, this research underscores the untapped potential of retrovation as a strategic tool for sustainable development. By analyzing the intersection of past knowledge and modern advancements, this study challenges the dominant narrative that innovation must always and only be forward-looking, instead highlighting the value of looking backward to move forward. In doing so, it repositions retrovation as a dynamic and forward-thinking strategy rather than a nostalgic return to the past. The study also advances the academic discourse on sustainable innovation by demonstrating how retrovation can complement contemporary technological advancements, thereby fostering new business models and production strategies that are both resource-efficient and socially responsible.

By offering a systematic framework, presenting novel empirical cases, and positioning retrovation as a viable mechanism for responsible innovation, this paper makes a significant contribution to both academic research and industry practice. It provides a foundation for future studies to build upon, encouraging further exploration of retrovation across different industries beyond the agrofood sector. Additionally, it offers actionable insights for businesses seeking to integrate traditional knowledge into modern sustainability strategies, thereby strengthening the role of retrovation in shaping resilient and environmentally conscious innovation pathways. Specifically, the findings of this study offer significant insights for managers, entrepreneurs, and policymakers. For each of the three identified categories of

retrovation, specific managerial implications can be derived. For instance, in the case of 'Reviving Historical Materials and Machinery', companies can invest in the revival of traditional crops or tools as a strategy to differentiate their products and align with consumer demand for authenticity and sustainability. For 'Modernizing Traditional Techniques', firms can adopt hybrid technological-artisanal production processes that leverage tradition while ensuring scalability and quality control. In the 'Reinventing Historical Methods' category, businesses can explore new market segments by recontextualizing ancient practices to meet modern values such as health, circularity, or resilience. Policymakers, in turn, can design incentive schemes and regulatory frameworks that facilitate the integration of retrovative practices, especially in sectors with strong cultural or environmental impact. Ultimately, this study emphasizes the strategic role of retrovation in business model innovation, offering pathways for sustainable and historically grounded competitive advantage.

Key words: *retrovation; innovation; sustainability; agrofood sector*

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Track 4
International Business

The Link Between Humane Entrepreneurship and International Competitiveness: An Explorative Analysis of Key Dimensions

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Abstract

Understanding the factors that shape firms' international competitiveness has become increasingly important in a rapidly evolving global economy. Among emerging business paradigms, Humane Entrepreneurship (HumEnt) has gained attention for integrating ethical, sustainable, and human-centric principles into business strategies. This study examines the extent to which HumEnt contributes to firms' international competitive advantage by focusing on its three core dimensions: entrepreneurial orientation (EO), sustainability orientation (SO), and human resource orientation (HRO). Adopting a quantitative approach, we analyze data from a sample of 120 international Italian firms to assess how these pillars influence their global market competitiveness. Our preliminary findings indicate that HRO has a statistically significant positive association with multiple dimensions of international competitiveness, including profitability of international operations, sales volumes, and overall performance. Meanwhile, EO and SO exhibit more variable effects. These results suggest that firms prioritizing employee well-being, development, and ethical labor practices tend to experience enhanced competitive outcomes in global markets. Furthermore, we find that a holistic integration of all three HumEnt dimensions can generate a synergistic effect, enhancing firms' international market share and reputation. This work adds to existing academic research by clarifying the intersection of HumEnt and International Business studies, while offering managers actionable insights on leveraging HumEnt as a strategic tool for global success.

Framing of the research. *The contemporary business environment is characterized by evolving expectations, requiring corporations to move beyond traditional profit-driven models and address pressing societal and environmental challenges (Ghauri et al. 2021). The increasing complexity of global issues, including climate change, social inequality, and environmental degradation, has prompted a reassessment of corporate roles and governance (Parente et al. 2021; Zhao et al. 2024). As these challenges become more pronounced, there is a growing recognition that dominant economic systems require reevaluation (Mazzucato 2018). While capitalism has historically generated wealth and driven economic progress, it has also contributed to environmental and social dilemmas, leading to critical debates on how " reimagining" it to serve broader societal goals (Henderson 2021).*

Businesses are often perceived as both contributors to and potential solvers of these global challenges (Porter and Kramer 2018). Consequently, corporations are increasingly expected to adopt substantive measures to enhance societal and planetary well-being (Ghauri et al. 2021; Zhao et al. 2024). This shift has heightened the emphasis on sustainability, ethical conduct, and corporate social responsibility (CSR), calling for innovative business paradigms that integrate economic objectives with broader societal concerns. Scholars argue that these challenges can be addressed within the capitalistic framework by embracing socially responsible and generative business practices (Mayer 2021). Purpose-driven companies, which incorporate social concerns, long-term orientation, and local environmental considerations into their value propositions, are becoming key agents of change (Muñoz et al. 2018; Mayer 2021; George et al. 2023).

Building upon this perspective, Humane Entrepreneurship (HumEnt) has emerged as a promising framework that combines entrepreneurial strategies with a robust commitment to social, environmental, and human-centric values (Parente et al. 2018). Unlike conventional models, HumEnt prioritizes a balanced approach that ensures value distribution to employees, stakeholders, and society at large (Kim et al. 2018). Its foundational pillars - Entrepreneurial Orientation (EO), Sustainability Orientation (SO), and Human Resource Orientation (HRO) (Parente et al. 2021) - provide both a theoretical and practical basis for firms to innovate and compete globally while simultaneously addressing

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modern business imperatives. By embedding ethical considerations and sustainable practices within the firms' core business, HumEnt enhances managerial decision-making, employee engagement, and long-term business growth (Kim et al. 2021).

In recent years, HumEnt has gained prominence as a holistic model (Bae et al. 2018; Kim et al. 2018; Parente et al. 2021; Vesci et al. 2023). By fostering an entrepreneurial mindset that creates value for shareholders while prioritizing employees, communities, and the environment (El Tarabishy et al. 2022; Vesci et al. 2023), HumEnt challenges the traditional notion of profit maximization. Instead, it shifts the focus toward sustainable growth and societal well-being (Parente et al. 2018).

HumEnt expands on established business frameworks including entrepreneurial orientation (Covin and Slevin 1989; Covin et al. 2006; Covin and Lumpkin 2011), sustainability (Kuckertz and Wagner 2010; Roxas and Coetzer 2012; Muñoz and Dimov 2015), and human resources literature (Kim et al. 2018), introducing a more integrated strategic approach. These elements collectively form the foundation for Humane Entrepreneurial Orientation (HEO) (Parente et al. 2021), which prioritizes the human aspect of operations (Kim et al. 2021; Parente et al. 2021).

Recognizing firms as powerful instruments for societal transformation (Henderson 2021), HumEnt draws from CSR, EO, and servant leadership, placing social value creation at the core of business strategy (Parente et al. 2021). Rather than viewing ethical and socially responsible practices as regulatory burdens or compliance costs, HumEnt frames them as strategic requirements that can drive long-term business success (Aspelund 2017; Landowska et al. 2020).

Despite its theoretical promise, the implications of HumEnt for firms' international performance remain unexplored. A notable gap exists in understanding how these principles influence international competitiveness, which can be defined as a firm's ability to achieve superior performance relative to competitors in global markets (Cerrato and Depperu 2011). International competitiveness is a multidimensional construct that includes both traditional performance metrics, such as innovation and cost efficiency (Hult 2012), and intangible factors, including reputation, brand equity, and stakeholder trust (Cerrato and Depperu 2011). While existing research has extensively examined conventional strategies for global success, there is limited insight into how purpose-driven, humane enterprises navigate international markets. This gap underlines the need for investigation into how HumEnt principles shape firms' international competitiveness, particularly in balancing ethical commitments with market-driven requirements (Aspelund 2017).

International competitiveness is increasingly influenced by non-economic factors, such as sustainability and ethical conduct (Hult 2012; Chabowski et al. 2023). Humane Entrepreneurship Oriented companies can leverage societal values as a competitive advantage, fostering innovation (Vesci et al. 2023) and strengthening stakeholder trust (Kim et al. 2018; Landowska et al. 2020). By integrating HumEnt principles into their international strategies, firms can enhance regulatory compliance, risk management, and brand differentiation (Parente et al. 2018; Chabowski et al. 2023; Zhao et al. 2024). However, challenges such as increased operational costs and navigating diverse regulatory environments must be carefully addressed (Chakrabarty and Wang 2012).

The rising importance of ethical practices in global business indicates that integrating HEO into internationalization strategies could play a crucial role in enhancing competitiveness and improving overall performance (Vesci et al. 2023). As businesses continue to navigate the complexities of an unpredictable global market, the HumEnt framework may offer a valuable approach, as it enables organizations to identify and leverage new opportunities for innovation, ensuring sustained growth. It could foster empowerment and excellence, providing a strategic advantage for firms as they expand their presence and drive success in global markets (Bae et al. 2018).

Purpose of the paper. *This study seeks to investigate the influence of the three fundamental dimensions of HumEnt (Parente et al. 2021)- EO, SO, and HRO - on firms' international competitiveness. Specifically, we aim to address the following research question: To what extent do EO, SO, and HRO influence international market success for firms? Our research focuses on an analysis of 120 international manufacturing firms, examining their strategic behaviors and competitive outcomes; at this stage of the research, the analysis is still exploratory. Particularly we will investigate the relationship between HumEnt factors and various measures of international performance and international competitiveness (e.g., market share, sales volumes, sales growth, profitability, expansion of product offerings, firm reputation, overall international performance) (Gerschewski et al. 2015; Donbesuur et al. 2020) analyzing the likelihood of firms achieving higher performance levels.*

By analyzing this relationship, we focus on filling the existing research gap and providing a novel understanding of the topic under scrutiny, building empirical evidence and insights on how to leverage HumEnt as a strategic tool for improving organizations' international competitive positioning and performance.

Methodology. *The primary data was collected within the PRIN project funded by the Italian Ministry of University and Research. To ensure a rigorous data collection process, we employed a structured survey administered to a comprehensive group of Italian firms, including Best Place to Work 2023 firms, Eco-Management and Audit Scheme (EMAS) certified firms, B-corporations, companies listed on the Italian Stock Exchange, Euronext Growth companies, and innovative SMEs, as classified under Italian regulations. By including these categories, we created a sample that effectively represented the breadth of the Italian business landscape, encompassing a wide range of industries and organizational structures. The survey was conducted using an email-based approach between December 2024 and February 2025. This method was preferred for its efficiency and accessibility, allowing us to gather responses from a wide array of Italian companies.*

A total of 230 fully completed questionnaires were obtained. However, our study specifically focused on firms engaged in international activities and their performance in global markets. Therefore, we filtered responses considering only

companies that had fully completed the survey section on international competitiveness and performance. To maintain data integrity and avoid bias in our results, we excluded questionnaires with missing or incomplete data before proceeding with the analysis, obtaining a final sample of 120 firms.

The data collection was designed to assess multiple dimensions of international business competitiveness. International performance measures were adapted from Donbesuur et al. (2020) and Gerschewski et al. (2015). To examine HumEnt, we employed specific measures adapted from Vesci et al. (2024). These items were designed to cover all the key dimensions of HumEnt and were measured on a 7-point Likert scale (Table 1).

To ensure robust analysis, a multi-step approach was applied, including descriptive statistics, factor analysis, and correlation analysis. First, the distribution of key variables was analyzed. Second, we performed an Exploratory Factor Analysis (EFA) to extract underlying factors from the HumEnt measures. Finally, given the characteristics of the variables, Spearman's rank correlation was computed to explore the relationship between the HumEnt factors and international competitiveness indicators. Additionally, we engaged in preliminary regression modeling of the data to gain initial insights into the factors influencing international competitiveness.

Tab. 1: Variables Description

		Measurement Item	***Description***	***Unit***
HumEnt				
-	EO	*In general, my company places a strong emphasis on the marketing of products and services vs innovation, R&D, and technological leadership (EO1)*	Likert Scale from 1 (commercialization) to 7 (innovation) (Adapted from Covin and Slevin 1989)	Scale (1-7)
		When facing competition my company typically tries to avoid competitive clashes, preferring a "live-and-let-live" posture vs adopts a highly competitive stance, regardless of what competitors do (EO2)	Likert Scale from 1 (live-and let-live posture) to 7 (competitive stance) (Adapted from Covin and Slevin 1989)	
		In decision-making situations involving uncertainty, my company typically adopts a cautious, wait-and-see posture to minimize the probability of making costly decisions vs typically adopts a bold, aggressive posture to maximize the probability of exploiting potential opportunities (EO3)	Likert Scale from 1 (wait-and-see posture) to 7 (aggressive posture) (Adapted from Covin and Slevin 1989)	
-	SO	*My firm carries out actions that contribute to building a better society or, in general, to improving its territory (SO1)*	Likert Scale from 1 (strongly disagree) to 7 (strongly agree) (Adapted from Muñoz and Dimov 2015)	Scale (1-7)
		My firm engages in actions to protect or restore the natural environment (SO2)		
-	HRO	*My company is empathetic to the difficulties and needs of its employees (HRO1)*	Likert Scale from 1 (strongly disagree) to 7 (strongly agree) (Adapted from Kim et al. 2018, 2021)	Scale (1-7)
		My company does not discriminate against any of its employees based on gender, race, religion, role, etc. (HRO2)		
		My company carries out actions that contribute to developing the skills and knowledge of its employees (HRO3)		
		My company offers its employees the concrete opportunity to support it in carrying out tasks and actions, including through delegation (HRO4)		
International Competitiveness		*Market share in international markets (IC1)*	Likert Scale from 1 (not at all good) to 7 (excellent) (Adapted from Donbesuur et al. 2020)	Scale (1-7)
		International sales volumes (IC2)		
		International sales growth (IC3)		
		International profitability (IC4)		
		Overall international performance (IC5)		
		Overall results obtained in international markets (IC6)		
		The international market share has increased (IC7)		
		The number of products offered abroad has increased (IC8)	Likert Scale from 1 (strongly disagree) to 7 (strongly agree) (Adapted from Gerschewski et al. 2015)	Scale (1-7)
		The presence in strategic markets/countries has improved (IC9)		
		The company's reputation in international markets has improved (IC10)		
		The company's competitiveness in international markets has improved (IC11)		

Preliminary Results and Future Steps. *Preliminary results include descriptive statistics about the data, EFA to identify underlying dimensions of HumEnt, correlation analysis to examine relationships between these dimensions and measures of international competitiveness, and preliminary regression modeling.*

Prior to conducting the main analyses, the distribution of the variables was examined to understand the data's basic characteristics. To deeply understand the underlying structure of HumEnt, an EFA was conducted on the nine items designed to measure its dimensions. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was calculated to

assess the suitability of the data for factor analysis. Its overall value was 0.73, with individual items ranging from 0.60 to 0.79, exceeding the commonly accepted threshold of 0.60. This result indicates that the sample was adequate for factor analysis. To determine the number of factors to extract, both the eigenvalue criterion and the scree plot were used. The eigenvalues for the first three factors were >1, indicating that they explain a meaningful amount of variance and justify their retention based on the Kaiser criterion. The scree plot visually corroborated this, suggesting a three-factor solution. Parallel analysis also supported the extraction of three factors. Following this preliminary assessment, a factor analysis with a Promax rotation was performed, specifying a three-factor solution. The results of the EFA revealed a clear factor structure (Table 2).

Tab. 2: Factor Matrix

Item	***Factor 1***	***Factor 2***	***Factor 3***
HRO1	0.61		
HRO2	0.51		
HRO3	0.78		
HRO4	1.04	-0.35	
SO1		1.03	
SO2		0.65	
EO2			0.76
EO3			0.62
Eigenvalue	2.36	1.82	1.04
% of variance explained	26	20	12

Factor 1, labeled as HRO, is characterized by high loading on the four human resource items, which relate to employee treatment, skill development, and empowerment. Factor 2, labeled SO, is identified by high loadings on sustainability-related items, which assess action contributing to a better society and environmental protection. Factor 3, labeled EO, presents high loadings on items measuring the company's competitive stance and posture towards uncertainty. Notably, item EO1, emphasizing marketing vs innovation orientation, did not exhibit a strong loading on any of the identified factors.

To further determine the adequacy of the EFA, a chi-square test was conducted. The result was a chi-square statistic of 21.42 with 12 degrees of freedom (p=0.045). While the p-value is marginally significant, several points support the adoption of a three-factor model. First, the identified factors are theoretically sound (Parente et al. 2021) and readily interpretable. Second, the model explains a reasonable amount of variance (58%), demonstrating practical significance by capturing a substantial proportion of the data availability. Adding more factors would likely increase complexity without contributing substantially to the model's explanatory power or interpretability. The factor scores derived from the EFA were saved as continuous measures of HRO, SO, and EO for use in subsequent analyses.

To explore the relationship between the HumEnt dimensions and the measures of international competitiveness. Spearman's rank correlation coefficients were calculated. This non-parametric method was chosen due to the ordinal nature of the international competitiveness variables. Correlations were calculated between the original HumEnt items (EO1 to EO3, SO1 to SO2, HRO1 to HRO4) and international competitiveness measures (IC1 to IC11), as well as between the factor scores (Factor1, Factor2, Factor 3) and the same international competitiveness measures. The correlation matrix for the original HumEnt items revealed several significant relationships with the international competitiveness measures. Items related to HRO generally showed more frequent and stronger positive correlations with international competitiveness indicators compared to the EO and SO items.

The correlation matrix using factor scores also revealed some significant relationships (Table 3). First, we were able to confirm the results of the EFA, looking into the correlation of factors. Then we examined the correlation of single factors with international competitiveness measures as coded above. Factor 1, HRO, showed statistically significant positive correlations with almost all the measures of international competitiveness except for IC8, IC9, and IC11. Factor 2, SO, exhibited a statistically significant negative correlation with international profitability (IC4). This can be attributed to the additional costs associated with implementing sustainability practices, which may initially outweigh the financial benefits. Factor 3, EO, showed few statistically significant correlations with overall results obtained in the markets (IC6) and the international market share (IC7).

Preliminary regression analyses were conducted to explore the predictive capacity of the HumEnt dimensions (Factor1, Factor2, Factor3) on the measures of international competitiveness. Given the ordinal nature of the dependent variables, ordered logistic regression models were employed. The results suggest that HRO (Factor 1) has a statistically significant positive relationship with all the international competitiveness dimensions. EO (Factor 3) appears to positively influence the measures of overall results obtained in international markets (IC6), the international market share (IC7), the presence in strategic markets (IC9), and the company's reputation (IC10). The SO dimension (Factor 2) was less consistent with significant impacts solely on international market share (IC7), the number of products offered (IC8), and the firm's reputation (IC10).

It is noteworthy that for both company reputation (IC10) and market share (IC7), a combined significant positive effect of all three factors was observed. This suggests a synergistic effect when all three HumEnt dimensions are

integrated, which can also be viewed in the coefficients observed. Although regression data are preliminary, this supports the idea that the three dimensions enhance each other.

Tab. 3: Correlation Matrix of Factor Scores and International Competitiveness Measures

Item	***Factor 1***	***Factor 2***	***Factor 3***
IC1	*0.24***	*-0.11*	*0.12*
IC2	*0.19**	*-0.09*	*0.11*
IC3	*0.26***	*-0.09*	*0.13*
IC4	*0.24***	*-0.18**	*0.13*
IC5	*0.25***	*-0.13*	*0.11*
IC6	*0.23**	*-0.09*	*0.20**
IC7	*0.19**	*0.03*	*0.23**
IC8	*0.15*	*0.03*	*0.08*
IC9	*0.10*	*0.07*	*0.13*
IC10	*0.33****	*0.01*	*0.14*
IC11	*0.17*	*0.03*	*0.08*

**p < 0.05, **p < 0.01, ***p<0.001*

This analysis is explorative and at an initial phase. Future steps will include the development of punctual hypotheses to be tested, the development of a more comprehensive framework, and the test of the relationship further supported by robustness tests to guarantee the validity of the results.

Research limitations. *The study presents a contribution to understanding the relationship between HumEnt and international competitiveness. However, some limitations should be acknowledged. First, while the EFA adopted in this research provides a promising insight into the underlying structure of HumEnt dimensions, it may have introduced potential biases due to the choice of factor extraction and rotation. Alternative classification methods, including clustering techniques, could further validate and refine these findings.*

Second, the preliminary nature of the analysis necessitates caution when drawing conclusions, as further validation is required to confirm the robustness of the proposed relationship.

Third, the study relies on self-reported survey data, which may introduce response bias, as participants might overstate their firm's commitment to HumEnt principles or their international success. Future research could incorporate further performance metrics or external assessments to complement self-reported data.

Finally, the study in its current form does not account for potential industry-specific variations in how firms implement HumEnt principles. Sectoral differences could influence the relative importance of EO, SO, and HRO in different business environments. Addressing these aspects could provide a more granular understanding of the role of HumEnt in shaping international competitiveness.

Managerial implications. *The findings of the research provide valuable managerial insights for firms aiming to strengthen their international competitiveness through HumEnt practices. The results highlight the critical role of HRO in enhancing firms' global positioning, suggesting that prioritizing employee well-being, ethical labor practices, and talent development can yield competitive advantages in international markets. Therefore, managers should invest in human capital strategies that foster employee engagement, innovation, and loyalty, which can contribute to long-term profitability and market success.*

Additionally, while EO and SO exhibit more variable effects, their integration into business strategy remains essential. Managers should adopt a balanced approach that combines risk-taking and innovation with ethical and sustainable practices, ensuring that competitive advantages are both profit-driven and socially responsible. Today firms are required to navigate the challenges of increased operational costs and regulatory complexities associated with these practices. However, proactive regulatory compliance and strategic partnerships with stakeholders could mitigate these risks and enhance brand reputation. This integrated approach allows firms to build a resilient and ethically sound foundation for international success.

In this context, a holistic view of HumEnt, where the effects of EO, SO, and HRO are leveraged collectively, is required. Businesses that embed these principles into their international operations could achieve differentiation and stakeholder trust, positioning themselves favorably in an increasingly competitive global market.

Originality of the paper. *This research offers a novel contribution to the intersection of HumEnt and international competitiveness, filling a significant gap in the existing literature. From this point of view, we contribute both to entrepreneurship and international business research. While prior studies have extensively examined factors influencing firms' global success, the integration of ethical, sustainable, and human-centric business paradigms into international strategies has remained unexplored. By analyzing the impact of EO, SO, and HRO on international performance, the study aims to introduce a comprehensive and multidimensional framework able to advance the understanding of how firms can align competitive strategies with moral imperatives.*

Finally, the current work demonstrates the paramount importance of HRO in contemporary business, challenging the traditional perspectives that focus on innovation and aggressive strategic postures over ethical considerations (Donbesuur et al. 2020). Prioritizing employee well-being and development emerges not only as a moral requirement but as a strategic advantage, serving as a catalyst for innovation and market differentiation.

Overall, this research offers valuable insights for scholars and practitioners interested in understanding and implementing humane, sustainable business models, particularly in light of increasing corporate accountability and social consciousness.

Key words: *Humane Entrepreneurship; Entrepreneurial Orientation; Sustainability Orientation; Human Resource Orientation; International Competitiveness; Sustainability*

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Cultural perspectives on leadership effectiveness. A comparative study between Italy and South Korea

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Abstract

This study explores the impact of differentiation of self on effective leadership across diverse cultural settings, specifically contrasting individualistic and collectivistic societies. Grounded in Hofstede's cultural dimensions framework and Bowen's family systems theory, the research underscores the necessity for leaders to balance personal autonomy with relational connectedness. In individualistic cultures, leadership is characterized by a focus on independence, innovation, and personal responsibility, whereas in collectivistic cultures, it emphasizes group cohesion and adherence to hierarchical norms. The study examines leadership behaviors shaped by the differentiation of self in two distinct cultural contexts: Italy, representing a Mediterranean individualistic society, and South Korea, rooted in Confucian collectivism. Using a sample of young adults from both countries, the research investigates how differentiation of self influences leadership effectiveness across cultural boundaries. These findings offer valuable contributions to intercultural leadership and psychology, enhancing understanding of leadership dynamics in an increasingly globalized organizational environment.

Framing of the research. *Leadership has long been a subject of scholarly investigation, yet its conceptualization and expression remain deeply embedded within cultural contexts. One crucial factor influencing leadership effectiveness is the differentiation of self (DoS), which refers to an individual's ability to maintain a personal identity while engaging meaningfully with others. This construct is particularly relevant in examining the intersection of personality traits, cultural dimensions, and leadership effectiveness. Given that DoS is inherently shaped by cultural influences, it plays a pivotal role in determining how individuals develop leadership competencies within their societies.*

Bowen's family systems theory (1978) provides a foundational framework for understanding emotional processes and family dynamics across generations, positioning DoS as a key component (Lee & Johnson, 2017). Scholars regard DoS as a fundamental developmental process, as individuals must learn to balance personal autonomy with their capacity for meaningful relationships ((Knerr & Bartle-Haring, 2010). This balance is particularly significant in leadership, as it equips individuals to uphold their integrity while fostering positive interpersonal relationships within organizational settings.

According to Bowen's model, DoS consists of two interrelated dimensions: intrapsychic and interpersonal. The intrapsychic dimension pertains to the ability to regulate emotions and reason effectively, allowing individuals to process their emotional experiences without becoming overwhelmed. A crucial aspect of this dimension is maintaining an "I-position," which enables leaders to remain composed in conflicts, engage in rational problem-solving rather than emotional reactivity, and avoid impulsive decision-making under stress. On the other hand, the interpersonal dimension involves cultivating close emotional connections while preserving individual autonomy. This capacity enables leaders to maintain intimacy without resorting to maladaptive coping mechanisms such as emotional fusion (excessive entanglement) or emotional distancing, which serves as an anxiety-regulation strategy through psychological or physical withdrawal (Bowen, 1978; Hermans, 2001; Kerr & Bowen, 1988).

Research within the Global Leadership and Organizational Behavior Effectiveness (GLOBE) project has reinforced the notion that leadership is culturally contingent, demonstrating that perceptions of leadership effectiveness differ across cultural settings (House, 2004; Javidan et al., 2004). A key question within this research domain is whether certain leadership traits and behaviors are universally valued or if they are significantly shaped by cultural norms and expectations (Javidan et al., 2004). This perspective underscores the relevance of DoS in leadership studies, as it provides an analytical lens for exploring how cultural contexts shape leadership development and expectations.

At an individual level, leadership effectiveness is often linked to relational and collaborative skills, emotional intelligence, and social perception. Implicit leadership theory suggests that the label of "leader" serves as a cognitive

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category used to distinguish individuals as leaders or non-leaders (Calder, 1977; Lord et al., 1986). This classification is influenced by various personal and contextual factors, including personality traits and early life experiences (Hunt et al., 1990). DoS plays a crucial role in this process, as leaders with a high level of differentiation are better equipped to handle interpersonal complexities, regulate emotional responses, and maintain clarity under pressure.

Personality traits such as extraversion, agreeableness, conscientiousness, openness, and neuroticism have been extensively linked to leadership effectiveness, shaping the way leaders interact and exert influence (Antonopoulou et al., 2019; Gkintoni et al., 2022). Moreover, psychological characteristics such as self-esteem, perception control, risk-taking propensity, trust, forgiveness, and reciprocity also contribute to leadership behaviors (Kandler et al., 2014). A high level of DoS enhances the ability to balance these traits, fostering adaptability, resilience, and strategic interpersonal engagement, which are essential for effective leadership across diverse cultural contexts.

Purpose of the paper. *Leadership effectiveness is a fundamental determinant of organizational success, and recent advancements in research have increasingly integrated cognitive science to examine the psychological mechanisms underpinning leadership. A significant development in this area is the concept of Implicit Leadership Theories (ILTs), which explain how individuals form leadership perceptions based on personal experiences, socialization, and environmental influences (Korukonda & Hunt, 1989). These cognitive frameworks shape how leaders are evaluated, distinguishing effective leadership from ineffective leadership. Hunt et al. (1990) demonstrated that leadership prototypes emerge through interactions between individual, organizational, and environmental factors, suggesting that leadership effectiveness depends on the degree to which a leader's attributes and behaviors align with followers' implicit expectations. Keller (1999) expanded on this notion by linking personality traits to leadership characteristics like sensitivity, commitment, and charisma. Furthermore, early socialization, particularly exposure to parental traits, influences idealized leadership models, emphasizing the importance of formative experiences. Incorporating cognitive science into leadership research highlights the role of self-regulation, emotional intelligence, and social perception in leadership success (Shondrick et al., 2010). However, while cognitive and personality-based perspectives contribute to understanding leadership effectiveness, they do not fully account for the impact of cultural context on leadership behaviors and perceptions.*

Leadership theories have historically been developed within Western frameworks, particularly in the United States, raising concerns about their applicability across different cultural settings (Peterson & Hunt, 1997). Cultural dimensions such as power distance, individualism-collectivism, and paternalism significantly influence leadership behaviors and effectiveness (Hofstede, 1980; House, 2004). In South Korea, where high power distance is prevalent, authoritarian leadership is more accepted than in the United States, where abusive supervision is widely rejected (Atwater et al., 2021). These cultural variations underscore the importance of validating leadership models across diverse cultural landscapes to determine their broader relevance (Javidan et al., 2004). Findings from the GLOBE study, which examined leadership across 62 countries, further emphasize these differences (House, 2004; Javidan et al., 2004). In Confucian Asian societies, such as South Korea, China, and Japan, self-protective leadership is favored, emphasizing hierarchy, procedural decision-making, and face-saving behaviors. Conversely, Nordic European cultures prioritize participative leadership due to their emphasis on egalitarianism and low power distance (Northouse, 2025) . Similarly, Anglo cultures (e.g., the United States, the UK, and Canada) align more closely with Nordic Europe, favoring participatory and charismatic leadership, whereas Confucian Asian cultures place less emphasis on participative leadership (Atwater et al., 2021). These findings highlight the necessity of context-sensitive approaches to leadership studies.

DoS provides a valuable theoretical lens for examining leadership across cultural contexts by explaining how leaders balance autonomy with cultural expectations. Cross-cultural psychology research has demonstrated that leadership prototypes and self-regulatory processes vary across societies (Laungani, 2007). In South Korea, a high power distance culture, leaders with high DoS are better able to navigate hierarchical structures while maintaining core leadership values. Such leaders can integrate traditional Confucian principles such as respect for authority, harmony, and social order, with transformational leadership elements. In contrast, in Italy, a low power distance culture, DoS allows leaders to blend participatory decision-making with assertiveness, fostering an approach that balances collaboration with decisiveness. In an increasingly globalized workforce, effective leadership requires the ability to adapt behaviors to cultural expectations while maintaining a consistent leadership identity. DoS is essential in this process, as it facilitates emotional regulation, clear decision-making, and cultural adaptability in leadership roles. As leadership research moves beyond Western-dominated models, integrating cultural dimensions with DoS offers a more holistic perspective on leadership effectiveness across cultural boundaries.

Cross-cultural organizational research has extensively examined the relationship between national cultural orientations and leadership effectiveness. Hofstede's (1980; 2010) cultural dimensions framework remains central to understanding variations in leadership expectations across different societies (Chai et al., 2016; Hofstede et al., 2010). Key cultural dimensions, including power distance, uncertainty avoidance, masculinity/femininity, long-term orientation, and individualism/collectivism, help explain leadership structures and organizational dynamics. The individualism-collectivism dimension, in particular, plays a crucial role in shaping leadership expectations ((Berry et al., 1997; Markus & Kitayama, 1991; Schwartz, 1994; Triandis, 1989). In collectivist cultures, such as those influenced by Confucian philosophy, leadership tends to prioritize social cohesion, hierarchical stability, and collective well-being. In contrast, individualistic cultures emphasize autonomy, innovation, and direct engagement with authority figures (Dewey, 1930; Dumont, 1986).

Bowen's Family Systems Theory (1978) offers a complementary framework for examining how cultural orientations impact leadership effectiveness. Leaders with high DoS can regulate their emotional responses, remain clear-headed in high-pressure situations, and maintain constructive interpersonal relationships without excessive emotional dependence or detachment. The expression of DoS varies across cultures, requiring comparative analysis. In Mediterranean cultures such as Italy, where social expressiveness and familial ties are strong, DoS manifests as a balance between autonomy and emotional closeness (Lampis et al., 2020; Manzi et al., 2006). Italian leadership styles often integrate participatory decision-making with relational warmth. In contrast, in Confucian collectivist cultures such as South Korea, DoS aligns with hierarchical stability and deference to authority (Moleiro et al., 2017; Sorokowska et al., 2017). South Korean leaders must reconcile Confucian values of group harmony and respect for seniority with modern leadership expectations. These cultural distinctions significantly impact leadership effectiveness and expectations. Leaders in highly individualistic cultures like the United States, Canada, Germany, and the UK are expected to embody autonomy, innovation, and self-reliance (Erdem & Safi, 2018). Leadership in these societies prioritizes independent decision-making and risk-taking. In collectivist cultures, such as China, India, South Korea, and Middle Eastern nations, leadership is more relational, focusing on group cohesion and consensus-building (Dwairy, 2004; Triandis, 2001). Hybrid cultures, such as those found in Southern Europe (e.g., Italy and Spain), combine elements of both individualistic and collectivistic tendencies, requiring leaders to navigate relational warmth while maintaining assertiveness (Lampis et al., 2020; Rodríguez-González et al., 2020).

Bowen's DoS framework offers a valuable perspective on how leaders from different cultural contexts regulate emotions, sustain clarity, and cultivate trust within organizations ((Jankowski et al., 2013; Lampis et al., 2017; Rodríguez-González et al., 2019; Skowron et al., 2009; Tuason & Friedlander, 2000). Leaders with low DoS tend to experience more significant stress, emotional instability, and dysfunctional relational patterns, negatively impacting their leadership effectiveness (Peleg, 2005; Tuason & Friedlander, 2000). Therefore, this study seeks to explore the role of DoS in shaping leadership effectiveness across cultural contexts, focusing on Italy and South Korea with the aim to provide a deeper understanding of culturally adaptive leadership styles, trying to answer this research question:

RQ: How does DoS influence leadership adaptability in distinct cultural contexts such as Italy and South Korea?

Methodology. *To examine the impact of cultural differences on the relationship between DoS and leadership behaviors in Italy and South Korea, this research uses a quantitative approach through the on-site administration of psychological questionnaires at young adults aged 18-30. This period of life is a critical period for establishing relational and autonomous capacities, making it a suitable focus for analyzing how DoS influences leadership traits such as emotional regulation, team cohesion, and decision-making.*

The first tool used was the DoS Inventory-Revised (DSI-R) (Skowron & Friedlander, 1998; Skowron & Schmitt, 2003) a 46-item self-report tool assessing four dimensions: Emotional Reactivity (ER); I-Position (IP); Emotional Cutoff (EC); Fusion with Others (FO). Responses were rated on a six-point Likert scale, with higher scores indicating stronger self-differentiation. The Italian version demonstrated good reliability (Lampis et al., 2017), while the Korean version was translated with native speaker supervision (Cho & Chung, 2002; Chung & Gale, 2006; Kim et al., 2015).

The second psychological tool used was the Outcome Questionnaire-45.2 (OQ-45.2) (Lambert et al., 1996), which assesses psychological distress across three domains: Symptom Distress (SD), Interpersonal Relations (IR), Social Role (SR).

Participants were native citizens of either Italy or South Korea, aged 18 or older. After excluding incomplete responses, the final sample comprised 352 individuals (201 females, 151 males). Recruitment followed a non-probabilistic sampling method, collecting 186 participants from Italy (2022) and 166 from South Korea (2023). Data was analyzed using SPSS version 20. Statistical analyses included reliability assessments, descriptive statistics, and inferential tests to examine the relationship between DoS and leadership traits. Internal consistency was measured using Cronbach's alpha.

Responses were rated on a five-point Likert scale, with higher scores indicating more significant distress. The tool has validated translations in both Italian (Lambert & Ogles, 2004; Lo Coco et al., 2006) and Korean (Kim et al., 2015; Kim & Chung, 2006) and had high internal consistency for both samples.

Results. *A one-way ANOVA examined cross-cultural differences in DSI-R subscales and OQ-45.2 scores.*

Key findings included: Korean participants showed higher emotional cutoff (EC) and lower emotional reactivity (ER) than Italians. Korean participants reported lower psychological distress. A negative association was found between DoS and psychological distress across both cultures. Higher ER and EC levels correlated with increased psychological distress in both groups. Lower IP scores were linked to higher distress. FO was significantly correlated with psychological distress only in Italians. Hierarchical multiple regression analyses identified significant predictors of distress: the Italian sample predicted greater distress than the Korean sample.

These findings suggest that DoS plays a more decisive role in predicting psychological distress in Italy than South Korea. Differentiation mechanisms vary culturally, with FO acting as a protective factor in Korea but unrelated in Italy.

Our findings reveal significant cultural variations in ER and EC between Italian and Korean young adults, reflecting cultural norms around hierarchy, emotional expression, and relational dynamics. These results confirm that leadership models must be adapted to cultural contexts, with DoS as moderating role in leadership style development across societies.

In Italy, higher ER and lower EC promote a leadership style centered on relational closeness, emotional engagement, and participatory decision-making. This aligns with the Mediterranean emphasis on social bonds and emotional openness, fostering trust, creativity, and team motivation. Leaders with a high DoS enhance emotional intelligence, enabling them to navigate team dynamics with empathy and attunement. This participative leadership style strengthens collaboration and trust, yet high ER may lead to impulsive decision-making and interpersonal conflicts if not effectively managed. To optimize leadership outcomes, Italian leaders should refine emotional regulation strategies to balance expressiveness with composure, ensuring emotional engagement remains a leadership asset rather than a liability.

In contrast, South Korean leaders exhibit higher EC and lower ER, reflecting societal values of harmony, hierarchy, and emotional moderation. Leadership in this context emphasizes composure, conflict de-escalation, and team cohesion, reinforcing collectivist organizational practices. The high EC observed in Korean participants aligns with Confucian values prioritizing social hierarchy and group harmony. Avoiding emotional entanglement is a protective strategy, enabling leaders to uphold group stability while minimizing conflicts (Bond, 1988; Byung-Ho, 2001; Han, 1989; Hofstede, 1980). In this setting, leaders with high DoS successfully navigate hierarchical structures while maintaining clarity in decision-making. They balance authority with relational harmony, ensuring team stability and cultural adherence to consensus-driven decision-making. However, excessive EC may hinder authentic interpersonal connections, potentially impacting team morale and communication. Effective leaders must regulate emotional expression to avoid alienating their teams.

These findings underscore the importance of cultural sensitivity in applying DoS to cross-cultural leadership effectiveness. Addressing our research question, what role does DoS play in shaping culturally adaptive leadership styles in Italy and South Korea? We can that in individualistic cultures such as Italy, leadership effectiveness is linked to autonomy, innovation, and personal accountability. Leaders with high DoS manage emotional reactivity and foster individual contributions while maintaining meaningful relationships. Italy's cultural blend of individualism and collectivism enables leaders to adopt participative leadership styles, leveraging relational closeness without compromising decision-making autonomy. DoS enhances emotional intelligence and conflict resolution, reinforcing trust and collaboration within teams. On the other hand, in collectivistic cultures like South Korea, leadership emphasizes group harmony, hierarchical respect, and relational cohesion. DoS functions differently, prioritizing relational harmony over autonomy. Emotional regulation (lower ER) and EC serve as cultural assets, helping leaders navigate hierarchical structures while minimizing conflicts. Effective leaders maintain personal clarity while ensuring group cohesion and fostering trust and stability.

Research limitations. *Despite its valuable insights, this study has limitations. First, while DoS was analyzed in a Korean sample, the measurement tool (DSI-R) was not fully validated for this cultural context. A culturally adapted version would enhance cross-cultural comparisons. Future studies should focus on validating a Korean version of the DSI-R to improve its empirical utility.*

Second, the study involved two distinct ethnic groups from two countries. While the sample included young adults with cultural backgrounds, sample sizes were limited, and gender imbalances were present, particularly in the Italian group. Future research should incorporate more gender-balanced samples to increase generalizability. Additionally, as this study focused on specific life stages, replicating research across different age groups and additional collectivist or Mediterranean cultures will be essential for broader applicability.

Another potential limitation is self-report measures, which may introduce monomethod bias. While the DSI-R is a widely recognized tool, Bowen (1978) emphasized the importance of qualitative methods such as family history interviews, genograms, and observational studies for analyzing differentiation processes. Future research should incorporate qualitative approaches to gain deeper insights into self-differentiation and its role in leadership and well-being across cultures.

Managerial implications. *Understanding the role of DoS in leadership can provide valuable insights for managers operating in diverse cultural contexts. Leaders who develop a high level of DoS can adapt their leadership styles to align with cultural expectations, enhancing team cohesion and organizational effectiveness. In individualistic cultures like Italy, managers with high DoS can effectively regulate emotional responses, engage in open dialogue, and foster a participative work environment. While emotional expressiveness is encouraged, excessive emotional fusion, where personal and professional boundaries blur, can also enhance trust, collaboration, and creativity within teams. For organizations operating in Italy, leaders should focus on clear and direct communication and balanced decision-making, ensuring that relational closeness does not compromise authority and efficiency. In collectivistic cultures, such as South Korea, DoS is particularly valuable in balancing hierarchical respect with team cohesion, reflecting the deeply rooted Confucian traditions. South Korean managers often take on a paternalistic leadership style, prioritizing group harmony and collective well-being. Leaders with high DoS demonstrate emotional clarity and composure, allowing them to maintain stability in high-pressure situations. Given that emotional control and relational harmony are prioritized in Korean workplaces, managers who develop DoS can minimize workplace conflicts, navigate hierarchical structures effectively, and foster a sense of security within teams.*

Therefore, for global businesses and multinational organizations, DoS provides a critical leadership competency that supports cultural adaptability. Leaders who can adjust their emotional regulation and relational engagement based on cultural expectations will be better equipped to manage cross-cultural teams. In Italy, this means encouraging open discussions and collaborative problem-solving, whereas in South Korea, it involves upholding structured leadership while maintaining relational sensitivity. Companies with diverse teams should invest in leadership training programs that

enhance DoS, enabling managers to balance personal autonomy with cultural awareness. Additionally, organizations expanding into new cultural markets can benefit from developing leadership frameworks that integrate DoS principles, ensuring that leaders are both culturally responsive and organizationally effective. While DoS specific expression varies, emphasizing relational sensitivity in South Korea and participative engagement in Italy, its core function remains the same: equipping leaders with the ability to navigate cultural complexities while maintaining personal and organizational integrity.

Originality of the paper. *This research offers a novel contribution to leadership studies by integrating DoS theory with cross-cultural leadership frameworks. While previous studies have explored leadership through the lenses of personality traits, implicit leadership theories, and cultural dimensions, little research has examined how DoS mediates leadership adaptability across different cultural settings. By focusing on how leaders balance autonomy and relational interdependence, this study provides a fresh perspective on leadership effectiveness as a dynamic interplay between psychological self-regulation and cultural expectations. Unlike traditional leadership studies that predominantly rely on Western-centric models, this research bridges individualistic and collectivistic paradigms, offering a comparative analysis of leadership styles shaped by cultural norms and emotional differentiation. Italy, representing a hybrid cultural model (blending individualism with collectivism), and South Korea, a Confucian collectivist society, provide contrasting yet complementary case studies to explore how DoS enables leaders to regulate emotions, manage hierarchical relationships, and enhance team cohesion.*

Additionally, this study extends Bowen's Family Systems Theory beyond its conventional applications in psychology and family dynamics, demonstrating its relevance in organizational behavior and leadership development. By linking emotional regulation, self-concept, and cultural adaptation, this research provides new theoretical insights and practical managerial implications for global organizations. Ultimately, this study challenges existing leadership paradigms, advocating for a culturally adaptive and psychologically informed approach to leadership effectiveness in diverse organizational landscapes.

Keywords: *Bowen Theory; Differentiation of Self (DoS); Cross-Cultural Leadership; Leadership Effectiveness; Individualism-Collectivism; Emotional Regulation in Leadership.*

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How Incubators and Accelerators Foster Startup Internationalization

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Abstract

In an increasingly globalized market, startups, as new ventures, face significant challenges in their internationalization process, including regulatory obstacles, cultural differences and the need to establish awareness in foreign markets. This study explores the role of accelerators and incubators in supporting startups' international expansion. Through a qualitative approach based on 11 semi-structured interviews with professionals, our findings highlight that incubators and accelerators provide startups with tailored programs for internationalization, mentorship and key resources. Specifically, accelerators facilitate rapid market entry by offering networking opportunities, investor access and training, while incubators provide long-term support to overcome cultural and regulatory barriers and develop the business plan effectively to achieve the growth stage. This study contributes to the literature by offering a novel perspective on how accelerators and incubators facilitate the internationalization process of startups, particularly offering tangible and intangible resources and fostering the development of business relationships. Finally, the findings of this research offer managerial implications for professionals and policymakers operating in the startup's ecosystem.

Framing of the research. *Nowadays, startups are no longer confined to their local markets, but they aim to expand globally to survive and stay competitive in dynamic industries (Mintz and Lilien, 2024; Olivieri and Hu, 2025). However, achieving international markets poses significant challenges, such as facing new regulatory landscapes, cultural differences and establishing business relationships with foreign actors without being known. In this scenario, accelerators and incubators emerged as key actors in addressing these challenges, offering startups tailored programs, mentorship and resources to facilitate their internationalization process (Dourado Freire et al., 2023; Runfola and Monteverde, 2023). For example, accelerators and incubators equip startups with key resources, such as insights and knowledge about the international target markets, and provide companies with specific skills, such as the ability to manage social media for marketing purposes (Hussain and Barman, 2025). Moreover, with their programs, these actors support startups in identifying funding opportunities to support their finance capacity (Paoloni and Modaffari, 2022), as well as establishing business relationships with international suppliers, partners and institutions. According to Grilli and Marzano (2023), startups located in academic accelerators are more likely to establish research and development alliances, while new ventures belonging to public accelerators are more likely to establish commercial alliances. As recently demonstrated by Pinto and Rua (2023), the development of a strong network of connections and the sharing of skills promoted by accelerators allows startups to better understand the markets they wish to penetrate: accelerators, in fact, connect entrepreneurs, investors and other international entities favoring a more credible market entry.*

Accelerator centers provide robust infrastructural support to innovative ventures (Fuad et al., 2024). Moreover, they enable information exchange among partners from different countries, thereby increasing trust (Schepis, 2021). Accelerators can also act as drivers of competition among early-stage startups (Moritz et al., 2021). Costa et al. (2024) argued that organizations such as accelerators and incubators should focus on developing an internationalization intention in their participants if their startups plan to internationalize. International entrepreneurship literature underscores that global business models hold a crucial role in firm performance and increases the resilient growth of local economies (Henn et al., 2022).

Accelerators and incubators are characterized by commonalities and differences. Accelerators relate to limited-duration programs, that support the startups entrepreneurial processes. The key resources provided by accelerators to startups involve a small amount of seed capital, co-working space, and relevant opportunities in terms of networking, educational and mentorship programs that consider a graduation event (Cohen et al., 2019). In addition, corporate accelerators are company-supported programs, characterized by limited duration, that support startups entrepreneurial process via mentoring, education and company-specific resources (Del Sarto et al., 2024; Kohaler, 2016).

In a different perspective, according to Hackett and Dilts (2004, p. 57), a business incubation center is defined as "a shared office space facility that seeks to provide its incubatees (the tenants) with a strategic, value-adding intervention system of monitoring and business assistance […] with the objective of facilitating the successful new venturing

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development while simultaneously containing the cost of their potential failure […] It is a network of individuals and organizations". The value provided by incubators to new firms includes access to networks as part of their value proposition (Bibeau et al., 2024; Hansen et al., 2000). Such incubators are often located inside the Innovation Hubs or the Science Parks that support the innovation process for tenants and other actors involved in R&D projects. Incubation is considered as a model of start-up facilitation (Bruneel et al., 2012) supporting startups performance (Hou et al., 2022). Over the years, the relevance of incubators for startups' growth has been associated with the provision of specialized services to sustain the startups' time-to-market and to facilitate the entrance of startups into a network characterized by technological and commercial players (Hausberg and Korreck, 2020).

The feature that accelerators and incubators share is networking, as they facilitate interconnected business and non-business relationships with heterogeneous organizations (Pauwels et al., 2016). In particular, this feature has proven to be crucial to the internationalization process of startups, considering the sharing of resources and the development of activities enabled by organizations belonging to national and international context. Access to external resources is considered a key factor for networking, as these resources allow for complex problem solving, reduced development time and cost, commercialization and faster diffusion of innovation (Aarikka-Stenroos et al., 2017).

Purpose of the paper. *Although scholars have focused on the internationalization of startups (e.g., Costa et al., 2024; Forsberg and Hulsink, 2024; Schepis, 2021), the role of accelerators and incubators in this process remains unexplored (Pinto and Rua, 2023). Thus, this study seeks to answer the following research questions: 1. How do accelerators and incubators support startups in their internationalization process? 2. What are the resources that accelerators and incubators provide to startups?*

Methodology. *The aim of this ongoing study is to investigate how incubators and accelerators contribute to the internationalization process of startups. Considering our explorative research aim, we opted for a qualitative approach (Yin, 1994) based on semi-structured interviews with professionals operating in accelerators and startups which participated in programs offered by these accelerators (Creswell and Creswell, 2018). Although the data collection phase is still ongoing, since July 2022 we collected 11 interviews with senior managers, manager partners, heads of incubation & open innovation and other professionals with experience in supporting startups during their internationalization process. Particularly, we interviewed 6 startups operating in international markets, 3 incubators, an accelerator and a venture capital firm.*

The semi-structured interviews followed a protocol defined by the researchers based on existing literature on the topic of the internationalization of new ventures. Although the topics covered in the interviews remained unchanged, the protocol was adapted depending on the role of the key informants. In particular, the key informants operating in startups were first asked to share their professional path, then the ways in which their companies are supported in their internationalization, the role of key actors, such as suppliers, institutions and investors, and the relationships with them. Key informants working in incubators and accelerators were asked to illustrate the role of their organizations in the internationalization strategies of new businesses, focusing on the programs offered to entrepreneurs. Key informants were asked to provide concrete examples and to tell stories that happened in their organizations. Finally, the researchers asked the key informants to share any interesting information on the topic which had not emerged from the questions included in the interview protocol. The interviews were conducted between 2022 and 2024 via Microsoft Teams and lasted approximately one hour. With the consent of the key informants, the interviews were recorded and transcribed.

The interview transcripts represent the material used by researchers in the data analysis phase, together with other documents shared by key informants, such as company presentations, reports, press releases and magazine articles. All materials were analyzed with coding strategies. Specifically, the open, axial and selective coding strategy was adopted to constantly compare the data with each other (Corbin and Strauss, 1990). As the coding process continued, themes related to the research object emerged and were interpreted and discussed by the researchers according to an a priori categorization based on what emerged from the literature review.

Results. *The preliminary findings of this research highlight the key role that incubators and accelerators play in facilitating the internationalization of startups, focusing on (1) the duration of the programs offered, (2) the type of services and tangible and intangible resources provided, (3) the networking development. However, some differences also emerged in the role of incubators and accelerators.*

As regards the duration of the programs offered, accelerator programs have a limited duration and support new ventures to reach the next step, such as attracting investors with a new round of investments or entering a new market. On the contrary, incubators offer support which can last some years in their organization plus additional support in connected organizations, such as innovation hubs, adapting to the needs of the startup with the aim of promoting its growth over time. In this vein, incubators provide tutorship services, supporting entrepreneurs in business plan development and mentorship services, based on the intermediation with big corporations and SMEs belonging to Innovation hubs.

Regarding the type of services and tangible and intangible resources provided, startups that participate in these programs exhibit a significantly enhanced ability to enter foreign markets. On the one hand, accelerators provide access to a network of mentors with international expertise, investors and local partners of the target market. In addition, accelerators often offer equity investment to their startups. On the other hand, incubators provide entrepreneurs consultancy services which prepare them to face the challenges associated with internationalization, such as a better understanding of foreign markets and local regulations, as well as the adaptation of the business ola to international context. Indeed, our results reveal that incubators play a crucial role in helping startups overcome cultural, regulatory

and operational barriers, facilitating the achievement of the growth stage through networking. Moreover, accelerators offer insights, for example about international customer preferences, which are key when accessing foreign markets. With their acceleration programs, accelerators assist startups in adapting their product offerings to align with the demands of various international targets. To this end, accelerators provide key resources and skills to entrepreneurs, such as training programs for specific tools.

Finally, regarding the development of relationships with key actors, incubators and accelerators offer opportunities to startups to participate in international events, pitch to investors and establish strategic partnerships. These opportunities enhance the credibility and visibility of startups in international contexts.

Research limitations. *This study has some limitations. First, the research approach based on semi-structured interviews with a limited number of key informants limits the generalizability of the results. This study could therefore be extended through interviews with other key informants operating both in startups and in incubators and accelerators.*

Second, the internationalization process of startups has not been analyzed from a longitudinal perspective. Thus, to investigate more deeply the role of accelerators and incubators in startups' internationalization strategies, this research could in the future include longitudinal case studies which consider the role of these actors over time.

Finally, this study did not consider the characteristics of the different international markets approached by startups supported by accelerators and incubators. The research could therefore continue considering the specificities of different international contexts.

Managerial implications. *This study presents various implications for professionals and policymakers operating in the startup's ecosystem. First, findings highlight the active role played by incubators and accelerators in startups' internationalization by providing capabilities, shaping strategies and overcoming barriers to access international markets. Incubators and accelerators favor startups' internationalization offering tangible resources (e.g., infrastructure, technical support) and intangible resources (e.g., knowledge, access to networks, trust reinforcement).*
Second, as previously pointed out by Donaldson et al. (2025), our findings confirm that these actors should tailor their support based on a startup's innovation level, providing customized training, mentorship and networking opportunities. In this regard, incubation and acceleration programs can be jointly developed with policymakers. Indeed, the role of accelerators in startups' internationalization is effective only if they are part of a larger network of actors (Noronha and Pillai, 2025), which include institutions, local partners, venture capitalists, etc. startups may become less reliant on business incubators (Gao et al., 2021) due to the experience they have gained and the direct contacts and networks they have established in the market.

Originality of the paper. *Although the academic debate has addressed the issue of the internationalization of startups in recent years (e.g., Kuster and Rezende, 2022; Olivieri and Testa, 2024), there is paucity of research on the role of accelerators and incubators in supporting the access of new ventures to international markets. This study contributes to the academic debate by highlighting how accelerators and incubators intervene in the internationalization process of startups.*

In particular, the findings of this research contribute to the academic debate by offering an original perspective on the role of accelerators and incubators in the context of international entrepreneurship (Zahra & George, 2017). The data analysis shows that both incubators and accelerators play a crucial role in enabling startups to build relationships with international actors and activating tangible and intangible resources. However, the activities of accelerators and incubators in this process are different. For example, accelerators focus on accelerating relationships with investors and mentors, while incubators promote long-term business relationships and the strengthening of key capabilities for entrepreneurs. In this vein, the preliminary results of our research highlight that the phenomenon of network building should be further explored in future studies on startups' internationalization.

Key words: *accelerators, incubators, internationalization, startups, business relationships*

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Between innovation and skepticism: AI's role in international strategic decisions for the food and beverage sector

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Abstract

The expanding integration of artificial intelligence (AI) in international business strategies has transformed decision-making processes. Nevertheless, skepticism persists, particularly among small and medium-sized enterprises (SMEs). This study explores AI adoption in international strategic decision (ISD) processes, focusing on managerial resistance to AI-driven decision-making, and identifying key psychological and functional barriers. Using a card-based game methodology, it investigates two Italian SMEs operating in the food and beverage sector. Findings reveal concerns over AI's compatibility with business culture, trust in algorithmic decisions, and the perceived trade-offs between AI efficiency and human expertise. Moreover, the discussion indicates that AI is seen as a complementary tool rather than a substitute for human judgment, with significant barriers linked to digital skills, transparency, and risk perception. This study enriches the body of research in international business by shedding light on the phenomenon of AI while also underlying the factors contributing to resistance or cautious adoption of AI-driven technologies in ISDs. Furthermore, it provides practical recommendations and actionable insights for firms seeking to integrate AI into their strategic operations effectively.

Framing of the research. *Digital transformation is a key priority today, requiring firms to integrate innovative technologies to improve data management. This transformation includes many technologies and advancements that are considered state-of-the-art, such as AI, additive manufacturing, the Internet of Things (IoT), and robotic automation (Strange et al., 2022). Among these, AI has emerged as a transformative force, fundamentally reshaping decisions by overcoming human limitations (Dwivedi et al., 2021; Kumar et al., 2022).*

Extensive research has documented the multifaceted advantages of AI for businesses, including improved decision-making capabilities, enhanced competitiveness, and increased operational efficiency (Magistretti et al., 2019; Denicolai et al., 2021). In the international business (IB) context, AI holds the potential to revolutionize firms' internationalization strategies by improving market selection processes, optimizing manufacturing locations, and refining global trade policies (OECD, 2022). As firms face the complexities of global competition, understanding the role of AI in shaping international strategic decisions (ISDs) becomes imperative. AI alters traditional paradigms, equipping firms with new tools to gain a competitive advantage in global markets (Feliciano-Cestero et al., 2023).

One particularly critical ISD that AI can influence is International Market Selection (IMS), a strategic decision process through which firms identify and prioritize foreign markets for expansion (Francioni et al., 2015). The literature has long recognized IMS' role in determining the success of strategic performance and IB operations (Brouthers et al., 2009; Martín Martín et al., 2022). Given the complexities of evaluating foreign market opportunities (He et al., 2016), selecting the wrong markets can result in substantial losses and missed opportunities, underscoring the need for methodical, and data-driven decision-making (Papadopoulos & Martín Martín, 2011). Other ISDs linked to IMS include the entry mode choice (Francioni et al., 2015), the selection of market segments and key international partners, such as distributors, suppliers, and customers.

Prior studies have explored the application of AI in international decision-making, such as Fish (2006) employing Kohonen Self-Organizing Maps to facilitate market selection. More recently, the capabilities of large language models, such as ChatGPT, have demonstrated potential in identifying optimal foreign markets for new product launches and clustering international markets based on shared attributes. These advancements suggest that AI could catalyze accelerating firms' global expansion efforts. By leveraging AI-driven analytics, firms, particularly small and medium-sized enterprises (SMEs) that often lack formal internationalization strategies (Vissak & Francioni, 2013; Musso & Francioni, 2014), can identify high-potential markets with greater precision.

However, despite its promising potential, technical and organizational barriers persist, such as AI complexity and data quality concerns (Paschen et al., 2020). Moreover, a critical gap exists in understanding the psychological and

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organizational factors that shape AI adoption for ISDs. The extant literature primarily focuses on AI's technical capabilities and economic benefits, while little attention has been paid to the underlying managerial attitudes influencing AI adoption decisions. Indeed, a crucial impediment to AI adoption lies in decision-makers' attitudes, specifically, their confidence or skepticism regarding AI-driven decision-making. While some executives recognize AI's strategic value, others hesitate to delegate critical business decisions to algorithms. The phenomenon of algorithmic aversion has been widely studied in behavioral research, yet its implications for managerial decision-making in IB remain underexplored (Mahmud et al., 2023). In particular, the Innovation Resistance Theory (IRT) is the most used in resistance literature (Talwar et al., 2023), reflecting this reluctance to use algorithms. One of the key benefits of IRT is its comprehensive approach to categorizing adoption barriers to innovations, which is divided into functional and psychological categories (Mahmud et al., 2023). Specifically, functional barriers, such as those pertaining to usage, value, and risk, arise when individuals perceive a significant shift due to the adoption of innovation. Psychological barriers arise when people's preexisting beliefs clash with the adoption of innovations and are related to tradition and image (Arif et al., 2020; Kushwah et al., 2019; Ram and Sheth, 1989). IRT is used in this perspective to investigate the relationships between perceived obstacles and algorithm aversion (Lindebaum et al., 2020), offering a strong analytical lens that helps explain why people reject innovations (Kushwah et al., 2019). Notably, while IRT has been employed in consumer and innovation adoption contexts, its application to ISDs and specifically to AI resistance within them remains underexplored. This study fills this gap by explicitly using IRT to interpret managerial reluctance in adopting AI for ISDs, distinguishing it from existing models that focus primarily on technical or economic factors. Through this approach, the paper connects AI resistance to deeper psychological and organizational dynamics, offering a novel framework for IB scholars. To the author's knowledge, no previous study applied the IRT in the context of AI adoption for ISDs.

Purpose of the paper. *Based on the above, this paper aims to examine the adoption of AI as a transformative tool in international business strategies, particularly emphasizing its role in supporting ISDs. By addressing the dimensions and gaps identified, the study primarily seeks to explore the sources of resistance and skepticism in decision-makers involved in internationalization decisions hindering AI adoption. To achieve this, focusing on SMEs, the study leverages IRT as a framework to analyze the factors contributing to such resistance in the internationalization context, including infrastructural and organizational challenges (Paschen et al., 2020). Ultimately, this research offers recommendations to help organizations overcome resistance to AI adoption and guarantee better alignment across different organizational levels. By addressing these barriers, the study aims to support the integration of AI technologies into IB strategies.*

Methodology. *This study adopts the card-based game method as the primary research approach because it has gained recognition for facilitating structured yet flexible discussions, proving particularly effective in eliciting insights from participants by engaging them in interactive situations (Müthel & Saunders, 2008). Specifically, this methodology enables the integration of semi-structured interviews within a dynamic framework that encourages active participation and reflection among participants (Rowley et al., 2012). Unlike traditional interview methods, this approach promotes deeper engagement by using visual and tactile elements (cards representing key concepts, challenges, and opportunities) which enhance discussion and stimulate creativity. Moreover, the method's versatility in addressing multi-criteria decision-making scenarios is particularly relevant to this study. It enables participants to evaluate trade-offs between competing priorities, such as perceived benefits versus risks of AI adoption. By leveraging this method, the paper aims to uncover detailed insights into how AI can support ISDs like IMS while addressing organizational barriers to its implementation.*

The interview scenario was designed to systematically capture the strategic decision-making processes of firms concerning AI adoption and internationalization. A semi-structured interview framework incorporated open-ended and scaled-response questions to balance qualitative insights with quantifiable data. The interview was divided into key thematic sections, including company background, internationalization strategies, AI adoption, and the structured card-based game to assess barriers and drivers of AI implementation in strategic decisions. The conception of the cards started with a priori categorization, creating cards and categories based on the literature, following a deductive approach (Miles et al., 2014). In the following step, the category set was enriched and complemented with some concepts that spontaneously appeared during the interviews, thus adopting a mixed inductive-deductive approach (Müthel & Saunders, 2008). The cards showed and represented factors influencing AI adoption, and they were elaborated on and created through the themes identified by the IRT framework and other barriers and skepticism sources highlighted in the literature. The card game served as an interactive component, prompting respondents to categorize and prioritize perceived challenges and enablers of AI integration, especially concerning ISDs. For this reason, cards showing a specific ISD were also given during the interview, and participants were asked to physically connect these cards through arrows to demonstrate their priorities and connections visually. The concepts laid down by participants formed conceptual maps. Other empty cards were finally given so participants could use the inductive approach to generate novel concepts and ideas. The main cards used are represented in Table 1.

The study examined two case studies within Italy's food and beverage. This sector was selected due to its economic significance since the food industry represents the second most important one of Italian economy, making Italy the 10th exporter in the world (Caiazza & Volpe, 2014). The semi-structured interviews and the card-game sessions were conducted with the key decision-makers in ISDs from each SME. Participants include the export managers of the companies, who are responsible for making internationalization decisions. The names of the companies are labelled as Firm A and Firm B for confidentiality reasons.

Tab. 1: Cards used in the interview scenario

Aversion to Change	Cost Perception	Cultural and Ethical Alignment	Data Privacy Concerns	Digital Skills Barriers
Fear of Job Displacement	Image and Reputation Attachment	Integration with Human Expertise	Interoperability Problems	Levels of Transparency of AI technologies
Levels of Trust in AI	Perceived Effectiveness	Tradition Attachment	Risk Barrier	Usage Barrier
Value Barrier	Entry Mode Choice	International Market Selection	Partners Selection	Segment Selection

Results. *The qualitative data from the card-based game methodology highlight key patterns in internationalization strategies, AI adoption barriers, and attitudes toward digital transformation. Both companies demonstrate proactive and reactive internationalization strategies, with market selection and entry mode choices driven by a mix of structured decisions and emergent opportunities. In line with previous SME internationalization research (Vissak & Francioni, 2013; Musso & Francioni, 2014), neither firm follows a rigid, data-driven market selection process. Instead, decisions are based on networks, trade fairs, and demand signals from foreign distributors and customers. In this sense, firm A relies heavily on local distributors, leveraging their expertise to facilitate international expansion without direct market presence. Conversely, firm B has experimented with direct sales and e-commerce, even though its primary focus remains building trusted partnerships through selective engagement with key buyers. This is confirmed by Schweizer (2015), reporting that instead of using logical calculations, decision-makers act emotionally and focus on affordable loss, and Sarasvathy (2001) affirming that SMEs lack the resources and knowledge necessary to make them adopt a causal logic and therefore, they apply effectual logic, guiding managers' decisions under specific conditions where resources cannot be easily acquired and therefore, they proceed through experimentations.*

Concerning the AI topic, a key emergent theme across both cases is the coexistence of curiosity and skepticism towards the tools. While firm A demonstrates a greater degree of skepticism, rooted in reliance on traditional business relationships and artisanal expertise, firm B exhibits a more exploratory attitude, particularly in leveraging AI for communication and content creation. Neither firm systematically integrates AI into core strategic decision-making processes such as IMS, entry mode selection, or partner evaluation. In general, the skepticism surrounding AI adoption in this respect is linked to multiple factors.

First, there is a lack of internal competencies. Both firms indeed cite limited in-house AI expertise as a primary barrier. While large multinational corporations have dedicated data analytics teams (Meltzer, 2018), SMEs often lack the resources or technical skills to integrate AI-driven decision-making fully. This echoes previous findings on digital transformation challenges in SMEs (Paschen et al., 2020).

Second, there is a substantial misalignment between business culture and ethics: AI adoption is perceived as potentially incompatible with company culture, particularly for firms like firm A, where product quality and human relationships are central to the business model. This sentiment aligns with studies on algorithm aversion in managerial decision-making (Mahmud et al., 2023), where decision-makers prefer human intuition over AI-generated recommendations, particularly in high-stakes business contexts. Moreover, there is a spread feeling of uncertain cost-benefit perception. Both firms express concern over the perceived costs versus tangible benefits of AI implementation. While larger companies can justify AI investments through economies of scale, SMEs often find it challenging to see a clear return on investment. Consequently, AI is perceived more as a supplementary tool for operational tasks (e.g., marketing, translation, data processing) rather than as a transformative driver of strategic decision-making. Interestingly, while AI is met with cautious optimism for enhancing efficiency, its role in creative and intuitive aspects of decision-making remains contested. Firm A's experience with AI-generated content (e.g., product descriptions and label designs) reflects a broader concern regarding AI's inability to capture brand identity and cultural nuances. Similarly, firm B acknowledges AI's potential in information processing but remains hesitant about its reliability in market intelligence and customer engagement strategies.

Specifically, during the card-based game, both companies identified key sources of skepticism and barriers to the adoption of AI in their ISDs. Their responses highlighted distinct yet overlapping concerns, particularly regarding IMS, EMS, and broader internationalization strategies. In firm B, the export manager emphasized how the perceived cost of AI adoption and its misalignment with company culture and ethics created hesitation in integrating AI into IMS. The company, operating in the agri-food sector, relies on deeply relational and experiential market expansion strategies, making it difficult to imagine AI as a replacement for the intuitive and trust-based process of entering new markets. The manager also expressed concerns about AI's compatibility with human expertise in EMS, particularly in areas where tacit knowledge, interpersonal connections, and adaptive decision-making play a fundamental role. Furthermore, the fear that AI could eventually displace specific professional roles, particularly in market scouting and internationalization planning, added another layer of skepticism. When discussing partner selection and segment selection, the respondent did not explicitly associate specific AI skepticism categories with these phases but did raise broader concerns about the digital skill gap, transparency and trust issues, and risk perception, suggesting that the company lacks the internal knowledge to use AI effectively and remains doubtful about the reliability of algorithmic recommendations for evaluating new markets or foreign partners. Unlike firm B, firm A took a more integrated approach, considering AI-related skepticism as a challenge affecting all internationalization strategies rather than distinguishing between specific choices. The respondent highlighted interconnected barriers to AI adoption, including a lack of digital skills within the company,

skepticism about AI's efficiency, and concerns about implementation costs. He also emphasized how AI's incompatibility with human expertise and business processes created a significant limitation, particularly in a company where international growth is built on long-term relationships, artisanal expertise, and brand authenticity. Additionally, he expressed a strong perception of risk, worrying that reliance on AI-generated insights could lead to market miscalculations or poor partner selection, further reinforcing the company's preference for experience-driven, adaptive decision-making over data-driven automation.

These findings align strongly with the IRT framework. Functional barriers such as "cost perception", "usage barrier," and "risk barrier" were evident across both firms, illustrating how practical limitations hinder AI adoption in strategic decisions. Alongside these, psychological barriers, particularly "adherence to tradition", "concern for image and reputation" and "misalignment with culture and ethics" emerged as critical factors in shaping managerial resistance, revealing how deep-seated cultural values and identity concerns further compound the hesitation toward AI-driven decision-making.

Furthermore, in this wave, participants also highlighted new themes and wrote on the empty cards (thus following the inductive approach) pointing out new barriers or elements that might hinder the implementation of AI tools in ISDs. Specifically, both firms explicitly identified human-related elements as key barriers to AI adoption, even with different emphases. Firm A, on the one hand, pointed to "human sensibility" as a fundamental reason for resisting AI-based decision-making in international expansion strategies. The firm's identity is strongly rooted in craftsmanship, tradition, and artisanal production, making the adoption of AI for strategic decision-making seem antithetical to the company's core values. AI-generated recommendations, particularly in branding, market selection, and partner evaluation, are perceived as lacking the understanding that human intuition and experience provide.

On the other hand, firm B raised concerns regarding the general "human component", arguing that the firm's commercialization and internationalization processes rely on relationships and tacit knowledge. In this view, AI cannot replace the social and relational aspects inherent in business negotiations, customer acquisition, and partner selection. The manager emphasized that their export market success depends on product quality and the ability to communicate its value through direct interactions, which AI is not currently perceived as capable of replicating. This resistance to AI due to human-centered concerns aligns with broader discussions in algorithm aversion literature (Mahmud et al., 2023), where decision-makers in highly relational industries often prefer human judgment over algorithmic processing, particularly in domains that involve subjective assessments and trust-based relationships. The emerged inductive themes further reinforce IRT's utility in capturing non-technical dimensions of resistance, extending its application to the field of strategic decisions.

The skepticism toward AI-driven ISD appears to be deeply embedded in the food and beverage sector's characteristics. Unlike industries where data-driven decision-making is dominant (e.g., finance, logistics, and e-commerce), relationships strongly influence internationalization in food and beverage SMEs. These findings suggest that AI adoption in IB strategies may not be a one-size-fits-all approach. Sectors characterized by important levels of human interaction, sensory engagement, and brand heritage, such as food and beverage, are more likely to resist full AI automation in decision-making processes. This perspective aligns with previous research on sectoral differences in digital transformation (Kutnjak et al., 2019), where AI implementation is more readily embraced in data-driven and automation-intensive industries than in culture-dependent sectors. Despite AI's advanced analytical capabilities, experienced managers retain ultimate decision-making authority, relying on relational trust, tacit knowledge, and iterative learning to navigate international markets. This reflects a broader trend in IB research, where decision-makers favor AI as a support tool rather than a substitute for human expertise (Jarrahi, 2018).

Both cases demonstrate that AI adoption in internationalization processes is not merely a technological issue but a deeply embedded organizational and cultural challenge, especially in food and beverage, where authenticity, human interaction, and adaptive decision-making play a central role. While both firms acknowledge AI's potential to improve operational efficiency, their decision-makers remain skeptical about its capacity to support highly risky strategic decisions, particularly in areas where human factors still shape the market selection, entry modes, and partner engagement. These findings align with broader discussions on AI adoption in SMEs, reinforcing that sectors characterized by high relational intensity and strong cultural heritage may exhibit greater resistance to AI-driven decision-making than industries where data analytics and automation play a more central role in strategic planning.

Research limitations. *Despite the insights the study provided into the intersection of AI adoption and strategic decisions in SMEs within the food and beverage sector, several limitations should be acknowledged. First, the research is based on two case studies, which, while offering rich qualitative depth, limit the generalizability of the findings to a broader population of SMEs. Moreover, the food and beverage industry presents unique sectoral characteristics, such as a strong firm reliance on tradition, sensory-based consumer preferences, and relationship-driven market expansion, which may not entirely represent other industries where AI adoption is more prevalent. Additionally, another limitation stems from the rapidly evolving nature of AI technology. Furthermore, given that AI capabilities and applications continue to advance at a rapid pace, the conclusions of the study might not be applicable for very long. Lastly, while the analysis, including international decision-makers, provides a comprehensive view, it may not fully capture the perspectives of all stakeholders involved in AI adoption decisions, such as external consultants or even the intermediaries adopted by SMEs for their export activities. Moreover, since the study is based in Italy, its findings may have limited applicability and generalizability to other contexts. These limitations should be considered when interpreting the results and could serve as starting points for future research in this domain.*

Managerial implications. *The findings of this study suggest that AI adoption in ISD requires a balanced, tailored approach. Rather than replacing human expertise, AI should serve as a supportive tool, enhancing efficiency while respecting the intuitive and relational nature of decision-making in SMEs, especially in food and beverage. Managers must bridge the digital literacy gap, ensuring that employees understand AI's capabilities and limitations. Without it, skepticism persists, preventing firms from leveraging AI's potential. A significant barrier to AI adoption is its perceived misalignment with business culture. AI is often seen as incompatible in industries where trust, craftsmanship, and relationships define success. To overcome this, firms must gradually integrate AI, first applying it to low-risk tasks such as data analysis and trend forecasting before expanding its role in ISD. This allows managers to test AI's value while controlling high-stakes decisions. Another key challenge is the uncertain perception of AI's cost-benefit ratio. Unlike large companies, SMEs find it difficult to justify AI implementation without clear and immediate returns. Policymakers and industry associations should support SMEs by providing financial incentives, training programs, and access to affordable AI solutions. Given industry's emphasis on human relationships and brand authenticity, AI must be implemented to complement these values rather than undermine them. Beyond operational efficiency, managers should reimagine AI to amplify human capabilities rather than automate intuition. AI-driven insights could serve as a "second opinion" mechanism, helping leaders challenge their biases and refine their strategic decisions without feeling displaced by technology. AI could enhance storytelling, personalize customer engagement, and strengthen international branding efforts in sectors like food and beverage, where narrative and heritage are competitive advantages. Additionally, AI can play a transformative role in international negotiations and partner selection, identifying trust signals in global markets that human intuition alone may overlook. By combining AI-driven data with experiential knowledge, managers can navigate international expansion with greater precision, ensuring that technology supports rather than disrupts the art of deal-making. In this way, by gradually integrating AI, enhancing a culture of experimentation, and maintaining human expertise at the core of decision-making, SMEs can harness AI's potential without compromising relational strengths.*

Originality of the paper. *The originality of this study lies in its sector-specific focus on AI adoption in ISD in the food and beverage industry. In this sector, digital transformation is often met with skepticism due to its reliance on craftsmanship, relational trust, and cultural heritage. While much of the existing research on AI adoption has concentrated on large companies, this paper focuses on SMEs operating in a relational context, offering a fresh perspective on how AI fits into traditional business models. One of the key contributions of this study is its application of IRT as a framework in creating the cards used during the interview with the case studies to explain the psychological and functional barriers that hinder AI adoption in ISD. While previous literature has explored AI's technical capabilities and economic benefits, little attention has been paid to why decision-makers resist AI despite its potential advantages. This study fills this gap by showing that algorithm aversion is not just a technical concern but is also deeply rooted in organizational culture, trust, and human intuition. Another novel element is the card-based game methodology applied during the interviews. It provides a more interactive and engaging way to capture managerial attitudes and behavioral dynamics surrounding AI adoption. Unlike traditional surveys or structured interviews, this method allows for a more nuanced exploration of decision-making factors, uncovering implicit concerns that might not emerge through conventional data collection techniques. This methodological innovation enhances the depth of insight into how AI is perceived, debated, and prioritized by decision-makers in SMEs. This study also contributes to IB literature by highlighting that AI adoption is not uniform across industries. While data-driven sectors often embrace AI for automation and efficiency, SMEs in relationship-intensive industries like food and beverage are more resistant due to their reliance on tacit knowledge, brand authenticity, and personal relationships in internationalization strategies. The inductive approach used also allows for the identification of the new cards and themes especially highlighting the "human" centrality within the ISDs, showing a specific connotation of both "sensibility" and "human component" as a whole concept. These findings suggest that AI implementation in such sectors must be adapted to respect these unique characteristics, reinforcing the idea that AI should complement rather than replace human expertise. By addressing these dimensions, this paper enhances academic discussions and practical applications in AI and IB, underscoring that AI adoption is not a one-size-fits-all process and that its success depends on a gradual, context-sensitive, and strategically aligned approach. This study provides actionable insights for managers and policymakers on navigating digital transformation while maintaining the human-centric strengths that define competitive advantage in traditional industries.*

Keywords*: Artificial Intelligence; International Strategic Decisions; Innovation Resistance Theory; SMEs; food and beverage industry.*

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Corruption as a Tool in International Business: Conflicting Strategies at Company and Country Level

SERGIO ERNESTO VALENTINI[1]

Abstract

In the era of sustainable globalization and digital transformation, international marketing is increasingly called upon to align with ethical standards and societal expectations. However, a systemic threat persists beneath this imperative: corruption. This paper interrogates the underexplored role of corruption not as a random failure or external constraint, but as a ***deliberate, internalized strategy*** *within global marketing practices. It posits that in high-stakes sectors-where procurement opacity, competitive pressure, and institutional weaknesses converge-corruption operates as a "fifth P" in the marketing mix: Payoff.*

Drawing on interdisciplinary literature and an original cluster analysis of 16 European countries across four major indices (Transparency International CPI, Basel AML Index, World Justice Project Rule of Law, and Eurobarometer), this study identifies discrepancies between expert assessments and public trust. It demonstrates that corporate corruption is not merely a by-product of weak governance but often embedded in marketing strategies used to gain market access, influence decisions, and outcompete rivals. The findings reveal that marketing and compliance operate in tension-one rewarding performance, the other enforcing legality-creating fertile ground for unethical conduct.

The paper advocates a transformative view of marketing-beyond communication and compliance-toward a proactive role in ethical risk governance and institutional accountability. It contributes to the sustainability discourse by linking corruption to reputational, economic, and social risks, proposing new metrics and models for recognizing, measuring, and managing corruption as a strategic variable.

Ultimately, it calls for a renewed scholarly and managerial lens that frames corruption not as a peripheral anomaly, but as a core challenge for responsible internationalization, requiring structural reform, educational innovation, and systemic scrutiny. Marketing can and must lead-not merely follow-in restoring trust and fairness in global commerce.

Framing of the research. *Strategic Corruption as the Silent Partner in Global Marketing*

Literature Review: Corruption in International Marketing

Corruption integration within marketing literature is underdeveloped. Lambsdorff (2007) and Rose-Ackerman (1999) have laid foundational work on corruption's economic impact, yet its function as a marketing strategy is less frequently explored. Managerial Complicity and Organizational Culture are another overlooked determinant in bribing behaviours. Corruption is rarely the work of rogue individuals. As argued in Clegg et al. (2007) and Crane & Matten (2016), management is not ethically neutral. Ethics-based marketing literature calls for compliance, transparency, and corporate governance reform (Kotler & Lee, 2005), yet there's growing recognition that ethics alone cannot counter corruption when it is structurally embedded in marketing ecosystems, particularly in public procurement-heavy sectors and the gap between ethical marketing theory and real-world business conduct persists.

As Uhlenbruck et al. (2006) and Martin et al. (2009) show, bribery can evolve into an entrenched marketing strategy used to overcome market entry barriers, influence regulators, or manipulate competitors. Spencer and Gomez (2011) refer to this as the "grey market advantage", where firms internalize bribery costs into competitive pricing models. While most executives would never publicly admit to these tactics, their effectiveness in securing contracts and market dominance makes them hard to ignore. The long-term consequences-legal penalties, reputational damage, consumer backlash-are devastating (Schlegelmilch & Öberseder, 2010).

Ethics and corruption are embedded in business practice, not just abstract principles (Clegg et sal., 2007) and global corporations operate across diverse ethical standards (Crane and Matten, 2016).

Research frames corruption as a market entry tool, especially in regions with weak institutions (Sartor & Beamish, 2014). Firms use bribery not just to expedite bureaucracy, but to directly manipulate demand, gain shelf space, secure distribution rights, and outmanoeuvre competition (Martin et al., 2007). The concept of the "grey market advantage" has emerged to describe firms that internalize bribery costs as part of competitive pricing models (Spencer & Gomez, 2011).

The current focus on "Country-Level" Corruption is inconsistent with hard realities: it has strong limitations when focusing too much on country-level perception (Kaufmann et al. 2010). Critiques exist on simplistic national corruption explanations, and Husted (1999) introduced cultural and business-system variables to explain the interlocking of wealth

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generation, cultural propensity, and corruption behaviour. Alysandratos et al. (2024) demonstrated that taking a bribe is considered less acceptable than offering one, thus swaying the ethical balance in favour of the richer (the corruptor) against the poorer (the corrupted) and in general people hold nationality based inaccurate stereotypes regarding the propensity to accept bribes (Dorrough et al. 2023). This raises the problem of national stereotypes regarding who is more likely to offer or accept bribes-biases that misdirect anti-corruption policies and dilute accountability.

Companies in high-stakes sectors are vulnerable to corruption pressures, particularly and often times the marketing function coexists in tension with compliance-one incentivized by results, the other by rules (Clarke and Xu, 2002). As we mentioned earlier on, certain sectors are especially vulnerable to corrupt marketing practices, and at public level and institutional blind spots also exist.

Illegal marketing exists, and it goes by a name most scholars prefer to ignore-corruption. It operates as a "below-the-line" activity, an iceberg lurking beneath the visible strategies of multinational firms, especially in sectors like defence, pharmaceuticals, public contracts, automotive and infrastructure. Despite its central role in global competition, corruption remains the elephant in the room of marketing scholarship. Corruption is an aspect of marketing that no one wants to acknowledge-because no one can explain why a firm truly wins a contract when the decisive advantage is an untraceable, morally and legally unacceptable activity: bribing. Businesses thrive on secrets-proprietary know-how, patented processes, competitive pricing, and private client data-corruption is the dirtiest secret of all. Corruption is often mischaracterized as merely a public sector issue or a problem confined to specific countries, while it is fundamentally a people's problem-rooted in individual behaviour and organizational culture. It transcends borders and institutional types, manifesting as a strategic tool wielded by both public servants and corporate executives alike. Public corruption is not just a failure of governance-it is enacted by people against their own organizations. By contrast, in the corporate world, corruption becomes a calculated mechanism for gaining unfair competitive advantages for individuals (either as money taking bribes or enhancing performance for career and advancement purposes) and for the companies themselves. Corruption must be recognized not as a set of isolated incidents, but as a systemic issue that deeply market access or favourable terms. These actions are not peripheral-they are embedded within the strategic marketing playbook, disguised through intermediaries, inflated "consulting" fees, structuring of contracts that accommodate under-the-table agreements, or extravagant promotional campaigns. Thus, corruption becomes a structural element of international business strategy, not merely a moral lapse or legal anomaly. In this context, corruption is not always overt. It is often embedded within the strategic marketing and business development processes-ranging from the selection of local intermediaries to sponsorship of state-linked entities or the. Corruption is often a structural component of how international marketing strategies are conceived and executed: a form of illegal international marketing deserving to be studied and measured like any other market force. In industries where contracts are often worth billions and involve complex transnational stakeholders, the incentives for unethical practices are high. Enormous financial stakes, long project timelines, and opaque regulatory frameworks converge, make them fertile ground for unethical conduct. Companies vying for competitive advantage may resort to bribery, influence-peddling, or opaque lobbying .

This pervasive dynamic is captured by the notion of strategic corruption--the deliberate use of unethical or illegal practices as a calculated tool to gain and maintain for competitive positioning, market penetration and business advantage. This is corruption as deliberate policy, embedded within broader corporate strategies. Marketing plays a hidden yet critical role in enabling or countering this strategy. It becomes a tool not only for creating brand equity but also for concealing the less savoury dimensions of international expansion. Marketing can act as a smokescreen, obscuring corrupt dealings behind layers of branding, CSR initiatives, and misleading public narrative and scrutiny. The impact of corruption on sustainability is threefold: economical, environmental and societal. Economic sustainability is jeopardized by corruption practices as they expose private companies to substantial economic risks: the penalties for corruption range include financial fines, exclusion from entire markets, all the way to receivership and leading to the closing of the company themselves. Overlooking the threat to company's very existence posed by indulging in corruption practices may therefore be a very costly exercise. Companies often take advantage of their international operations to behave irresponsibly as regards the economic, environmental and social impacts of their activities, instead of pursuing forms of sustainable internationalization (Valentini, 2003).

Marketing holds also the power to shine a light on corruption, foster transparency, and champion ethical business conduct. When aligned with corporate integrity and societal accountability, marketing can serve as a tool for transformation-shaping both public opinion and organizational behaviour toward ethical norms.

This dual role-either complicit or reformative-places marketing at the centre of the debate over corruption and ethical conduct in international business. Corruption may help a company achieve short-term growth, win contracts, or enter restricted markets, but it simultaneously undermines public trust, distorts fair competition, weakens democratic institutions undermines, and perpetuates inequality. This contradiction places marketing at a critical crossroads. The tension between business gains and societal harms is not merely an ethical dilemma but a structural one, revealing the fractures between profit-driven logic and the principles of fairness, accountability, and sustainability. Marketing professionals, compliance officers, senior executives all find themselves navigating this tension daily. Their decisions ripple across not only their organizations but also the societies in which they operate, in boardrooms, advertising campaigns, and stakeholder engagement strategies every day.

Corruption is not confined to the domains of marketing or compliance. It is a deeply transversal issue that cuts across sociology, political economy, legal studies, and business ethics. The funds spent are company resources-strategically

allocated by senior executives, including CEOs, and integrated into organizational budgets and marketing plans. These activities are seldom disclosed, making them invisible and hard to measure, yet they follow deliberate strategies like any other form of market investment.

Private sector corruption often blends personal and corporate benefit under the guise of competitive necessity. This is not merely unethical; it is illegal-and yet it is frequently tolerated when the payoff is short-term profit. When state-owned enterprises (SOEs) or multinational corporations use extraterritorial marketing bribes to win contracts in poorer nations, the moral and legal implications are immense. Despite this, the marketing field remains largely unaware of the extraterritorial dimensions of corruption.

Purpose of the paper. *This study aims to fill a critical gap in both academic literature and practical understanding by exploring how corruption-particularly in the private sector and within international marketing-is currently measured. While corruption is often described as immeasurable or intangible, a variety of indices, rankings, and qualitative tools have been developed over the years to capture its prevalence. These methodologies often differ in scope, assumptions, and cultural sensitivity-leading to inconsistent or even contradictory representations of the same environments but hold similar views and results. What is missing is a comparative, critical assessment that evaluates how these indices converge or diverge in measuring private-sector corruption across different countries, sectors, and regulatory contexts. We examine these methodologies, seeking points of overlap and divergence. In doing so, it seeks to go beyond broad national characterizations while acknowledging that the reality of corruption is not neatly captured by quantitative data alone.*

Ultimately, this inquiry aspires to lay the groundwork for a more nuanced, multidimensional, and globally relevant approach to the study of corruption in business. It contributes to ongoing debates in marketing, compliance, sociology, international law, and business ethics, arguing that corruption must be treated not as a moral outlier but as a mainstream business strategy that demands systemic scrutiny. In doing so, it invites scholars, practitioners, and policymakers to shift their focus: from a narrow obsession with national reputations to a broader, more incisive analysis of how organizations operate, compete, and often succeed through illicit means.

Methodology. *Cluster Analysis of European Corruption Indices*

We carried out a data-driven cluster analysis of European countries based on multiple corruption and governance indices, aiming to highlight misalignments between expert evaluations and public perception.

The analysis used the following indices:

- *Transparency International Corruption Perceptions Index (CPI 2024)*
- *Basel Institute Anti-Money Laundering Index (Basel AML 2024)*
- *World Justice Project Rule of Law Index (2023)*
- *Eurobarometer 2024 Special Survey 548 on Corruption (Public Perception)*

Transparency International Corruption Perceptions Index (CPI) focuses on public sector corruption capturing perceived levels of corruption in the public sector within a country

Basel AML Index measures the risk of money laundering and related financial crimes in countries and jurisdictions around the world, with a composite methodology.

World Justice Project Rule of Law Index: focuses on how laws are applied, a complementary perspective to perception-based indices

Special Eurobarometer 523 Survey on Corruption measured the public citizen perception and trust toward institutions and companies.

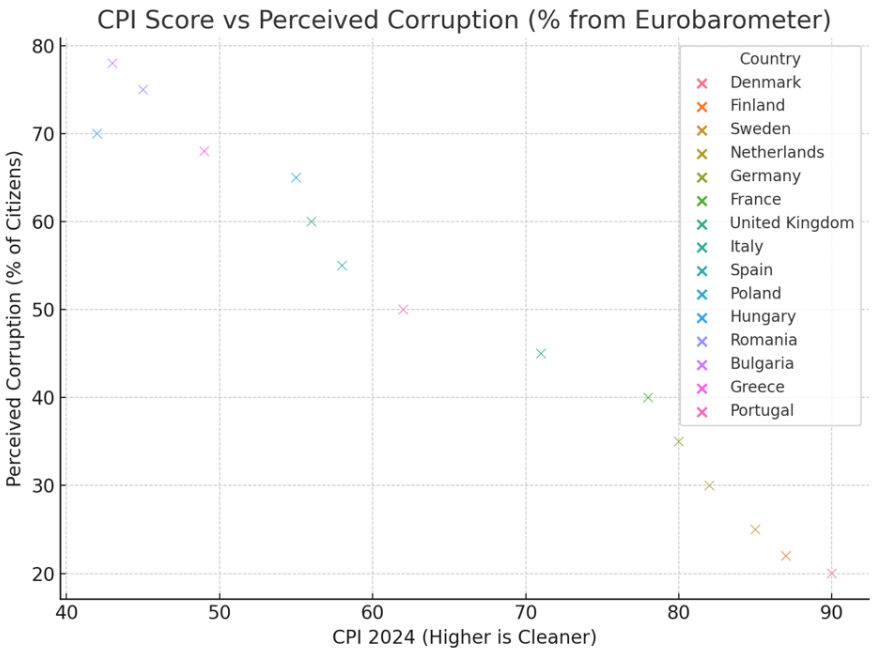
Normalized values were computed for all metrics, and a discrepancy index was calculated to measure the gap between expert assessments and public trust.

Results. *Comparative Corruption & Governance Dataset (Europe)*

Country	CPI 2024 Score	Basel AML Index 2024 Score	WJP Rule of Law Index 2023 Score	Eurobarometer 2024: % Who Believe Corruption is Widespread
Denmark	90	2.24	0.89	20%
Finland	87	2.30	0.87	22%
Sweden	85	2.45	0.85	25%
Netherlands	82	2.60	0.83	30%
Germany	80	2.75	0.81	35%
France	78	2.90	0.79	40%
United Kingdom	71	3.10	0.76	45%
Italy	56	4.20	0.68	60%
Spain	58	3.95	0.70	55%
Poland	55	4.50	0.65	65%
Hungary	42	5.10	0.60	70%
Romania	45	5.25	0.58	75%
Bulgaria	43	5.40	0.55	78%
Greece	49	4.80	0.62	68%
Portugal	62	3.50	0.74	50%

CPI scores range from 0 (highly corrupt) to 100 (very clean). Basel AML Index scores range from 0 (low risk) to 10 (high risk). WJP Rule of Law Index scores range from 0 (lowest adherence to rule of law) to 1 (highest adherence). Eurobarometer percentages represent the proportion of citizens who believe corruption is widespread in their country.

Chart 1: CPI SCORE VERSUS PERCEIVED CITIZEN CORRUPTION

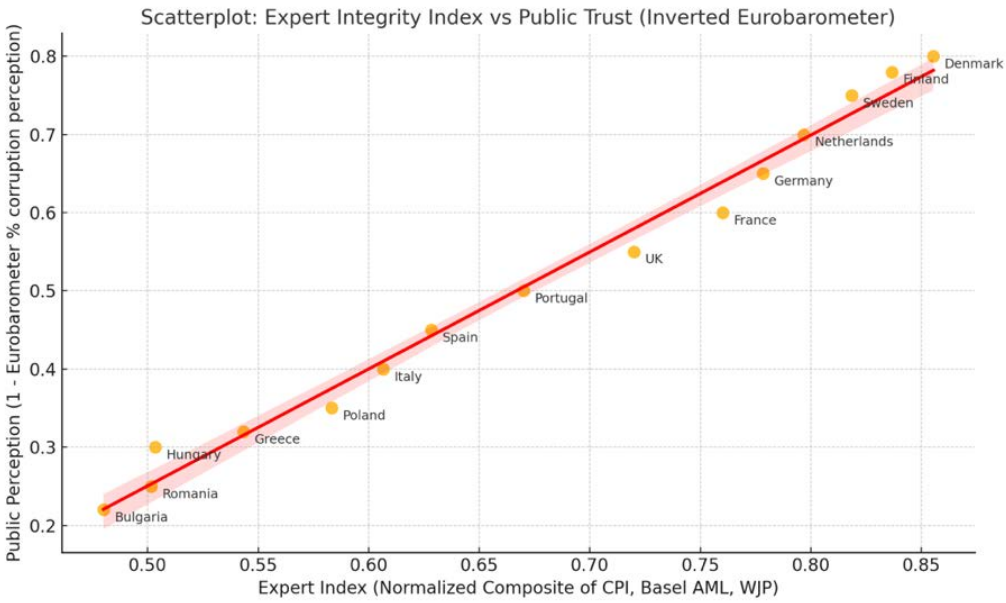


- *X-axis: Transparency International's CPI 2024 (higher = cleaner public institutions).*
- *Y-axis: Eurobarometer's % of people who think corruption is widespread (higher = more public concern).*

Next, a Discrepancy Index was computed, to enable visualization of discrepancies.
To analyze country discrepancies among the four indices the following methodology was used:
Normalization of All Indices
Scaling of each index between 0 and 1(inverting where higher scores mean more corruption)
Computing of a "Discrepancy Index" for each country as follows:

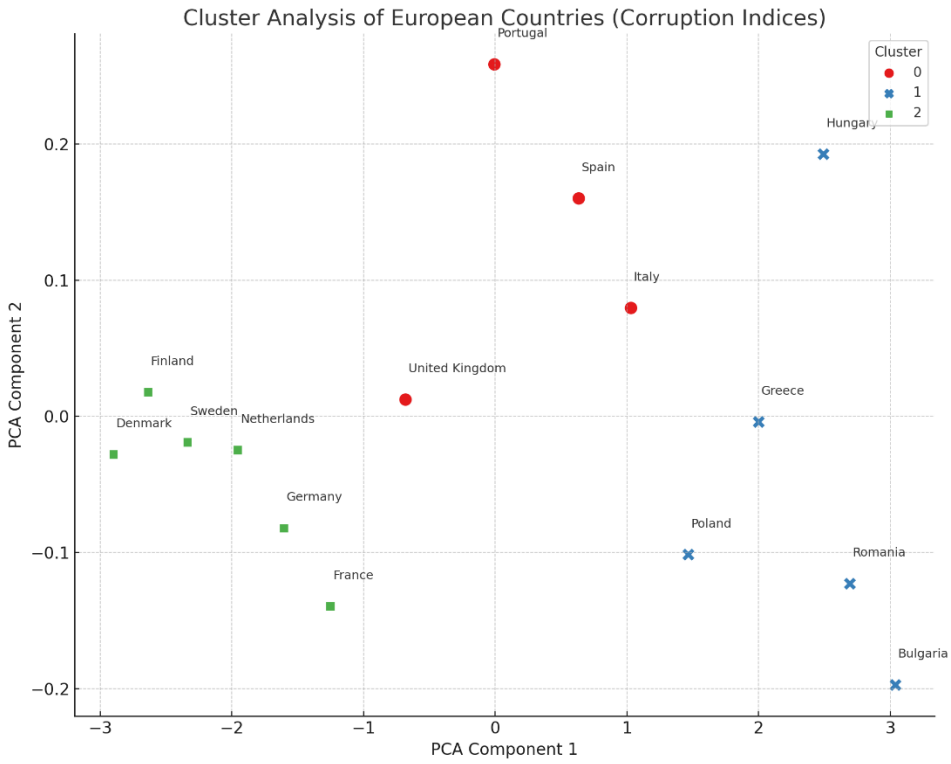
- *Discrepancy = Avg(Expert Indices) - Public Perception*
- *Expert Indices = average of normalized CPI, Basel AML (inverted), and WJP.*
- *Public Perception = inverted Eurobarometer (1 - corruption widespread %).*

Chart 2: EXPERT ASSESSMENT INDEX VS. PUBLIC TRUST



Here's a cluster visualization based on governance and corruption indices using PCA, grouping countries are grouped into three clusters based on CPI (Corruption Perceptions Index), Basel AML Index (inverted), World Justice Project Rule of Law Index and Eurobarometer perception of corruption (inverted). Each marker represents a country, and proximity indicates similar governance/perception profiles. Cluster differences might reveal High performers with aligned expert and public trust, Reputational gaps (high performance, low trust) and Underperforming systems with public awareness or denial.

Chart 3: COUNTRY SCATTERPLOT



Countries were clustered in groups:

- *Aligned reputations (high trust, high performance)*
- *Undervalued countries (low trust, high performance)*
- *Overvalued countries (high trust, weak governance)*
- *Systemically weak (low trust, low performance)*

Cluster Profiles

Cluster 0 - Mixed Integrity with Moderate Trust Gap

- *Countries: United Kingdom, Italy, Spain, Portugal*
- *Profile:*
  - *Avg CPI: 61.8 (moderate)*
  - *Avg Basel AML: 3.69*
  - *Avg Rule of Law: 0.72*
  - *Avg Public Perception of Corruption: 52.5%*

Insight: These countries exhibit moderately strong governance indicators but suffer from higher public skepticism. This trust gap may reflect ongoing reputational legacies or internal inconsistencies between policy and enforcement. Marketing efforts in these countries must navigate public distrust while showcasing real reforms and transparency.

Cluster 1 - Systemic Trust and Governance Challenges

- *Countries: Poland, Hungary, Romania, Bulgaria, Greece*
- *Profile:*
  - *Avg CPI: 46.8 (low)*
  - *Avg Basel AML: 5.01*
  - *Avg Rule of Law: 0.60*
  - *Avg Public Perception of Corruption: 71.2%*

Insight: This cluster shows the lowest integrity scores across all indices and the highest public perception of corruption. Governance is weak, and public distrust is very high. High alignment between expert ratings and citizen

sentiment-though both negative. International marketing strategies here must prioritize compliance, local engagement, and multi-stakeholder partnerships to rebuild trust.

Cluster 2 -

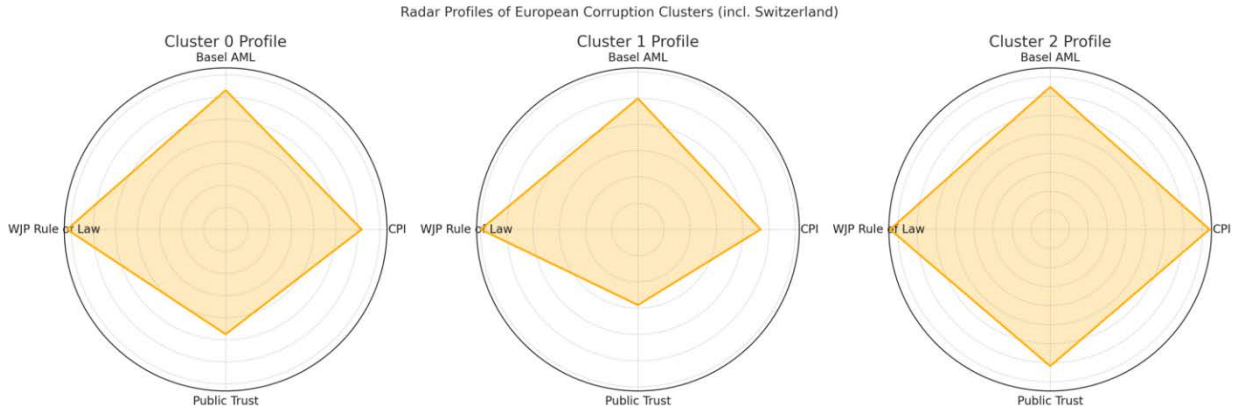
- *High Governance and Institutional Trust*

Countries: Denmark, Finland, Sweden, Netherlands, Germany, France, Switzerland

- *Profile:*
  - *Avg CPI: 83.7 (high)*
  - *Avg Basel AML: 2.54*
  - *Avg Rule of Law: 0.84*
  - *Avg Public Perception of Corruption: 28.7%*

Insight: These countries demonstrate high institutional quality and relatively low public concern about corruption. Marketing in these regions can leverage strong national reputations and focus on ethical branding and leadership in sustainability practices. Strong institutions and public trust. France slightly drags perception but still belongs to the high-integrity cluster.

Here are the radar charts showing the average governance and perception profiles for each cluster,



CLUSTER ANALYSIS

The cluster analysis suggests that a one-size-fits-all approach to anti-corruption marketing is ineffective. Instead, firms should align their strategies with local perceptions and governance realities. Countries with a high discrepancy index require greater transparency and demonstrable impact to restore trust. Meanwhile, high-performing clusters offer models for ethical value-based marketing.

Research limitations. *As the definition of corruption varies across cultures, it would be important top ensure a coherent approach to how corruption is defined. It is also worth noting the 4 different indices analyzed are from uneven sources and in some cases (AMLA Basel, WJP rule of law index) are not directly related to corruption but to the best proxy activity available. Finally, while the CPI and rule of law are related to public corruption, Basel index relates to business corruption and the Eurobarometer survey encompasses both.*

Managerial implications. *Corruption as a marketing tool in international business*

Corruption is defined: "to offer, promise or give any undue pecuniary or other advantage, whether directly or through intermediaries, to a foreign public official, for that official or for a third party, in order that the official act or refrain from acting in relation to the performance of official duties, in order to obtain or retain business or other improper advantage in the conduct of international business. The definition, contained in the OECD's "Convention on Combating Bribery of Foreign Public Officials in International Business Transactions" focuses almost exclusively on corruption in the public sector, considering private corruption only a residual activity, mainly encouraged by corrupt public officers. Therefore corruption, particularly in international marketing, has traditionally been treated as an external threat-a political or legal hazard to be managed by compliance departments of companies that would like to compete fairly but must unwillingly face the harsh realities of corrupt countries and cultures, a price to pay often to operate in under-developed on developing countries. With this approach, bribes are a cost to the company that reduces their margins and impossible to avoid without exiting from important or lucrative markets if competitors without scruples are left alone to deal with them.

A more critical and less sanitized lens reveals a different reality: corruption often functions as a deliberate strategic tool, embedded within the marketing apparatus itself. We propose to reframe corruption not as peripheral but as a "Shadow 4P marketing mix" that distorts the classic 4Ps model (Product, Price, Place, Promotion), adding an unofficial "fifth P": Payoff. Far from being random or incidental, corporate corruption is often deliberate, financed, and organizationally embedded, supported by an unethical culture of performance-maximization at all costs and requires reconsidering Porter's Framework and adding - wherever applicable - illegal activities.

The classic 4Ps framework-Product, Price, Place, Promotion-also offers a helpful lens for analyzing how corruption becomes embedded in marketing practice. In markets where bribery is normalized, each of the 4Ps is actively distorted:

- *Product: Specifications may be written to favour a particular supplier, especially in public procurement. Companies have both been implicated in manipulating product designs to lock competitors out of contracts.*
- *Price: Bribery becomes a hidden component of pricing strategies. Prices are inflated to include unofficial payments, rendering bribery "cost-free" for the corruptor-although not risk-free.*
- *Place (Distribution): Corrupted intermediaries control supply chains, securing exclusive shelf access or distribution rights.*
- *Promotion: Instead of promoting to end users, corrupt firms target purchasing managers and public officials with illicit incentives, bypassing traditional consumer persuasion entirely.*

This model transforms the marketing mix into a "shadow mix": one that drives competitive advantage through unethical influence rather than market value. Private companies and state-owned enterprises have allegedly engaged in these practices, not only in emerging markets where enforcement is weak, but also in developed countries in a collusive relationship with political decision makers.

Unlike traditional marketing tools, corruption circumvents rational consumer choice and institutional rules, relying on covert, often institutionalized influence. This strategy becomes especially dangerous in public procurement-heavy sectors-such as infrastructure, ICT, defence, and healthcare-where opacity, scale, and complexity make oversight difficult. This "Payoff Marketing" can be unknown to some competing companies, as by definition corruption behaviours are collusive in nature and kept as hidden as possible by those engaging in it.

Corruption also reshapes buyer-seller relationships. Instead of building customer loyalty through branding, firms bind purchasing managers through bribes. These managers become the most "loyal" clients-not because of brand strength, but because they are locked into exclusive, unethical transactions. This creates an illusion of legitimacy, particularly prevalent in sectors where entry timing is critical: early access, guaranteed by corrupt deals, eliminates competition before markets even open. A corruptive behaviour need not be prevalent: firms may blend corrupt strategy within normal operations, and behave asymmetrically across countries, distribution channels and even products. Corporate structures and marketing campaigns continue to operate as if business were being conducted ethically, masking deep structural flaws.

Corruption in international marketing is not a fringe issue. It is strategic, internalized, and outcome-defining, particularly in high-stakes sectors and poorly regulated markets. By reframing corruption as a "shadow marketing mix," we reveal its operational mechanics and ethical implications. Policymakers, marketers, and scholars must look beyond compliance rhetoric and tackle the structural incentives that normalize corruption. Without this shift, marketing will remain complicit in a cycle that trades short-term gains for long-term legitimacy and sustainability.

Unlike other marketing tools, however, it bypasses every rational purchasing decision, short-circuiting procurement processes with illicit influence. No executive would openly admit to it, and no textbook teaches it. Yet it is precisely because it is hidden, strategic, and outcome-defining that it demands our attention. If we analyze corruption using Porter's classic marketing mix-the 4Ps-we find it touches product (design specs rigged to favour one supplier), price (inflated to include bribes), place (distribution controlled by corrupted intermediaries), and promotion (incentives paid to decision-makers, not consumers).

In the realm of international marketing, corruption functions as a powerful-albeit unethical-application. It has been utilized by some of the world's largest multinational enterprises (MNEs) to secure contracts, dominate markets, and outmanoeuvre competitors. In these cases, price ceases to be a barrier; in fact, it often includes the cost of bribes, rendering the corruptive behaviours "cost-free" to the corruptors (albeit not risk free).

At the point of sale, corruption is often a facilitator. Corrupt category managers may deliberately withhold competitors' products from shelves or skew restocking practices to favour bribing suppliers. In terms of positioning, corruption ensures early market access and dominance, effectively eliminating competition before the market even opens.

Moreover, purchasing managers become the most "loyal" clients-not because of brand affinity, but because corruption locks them into exclusive, unethical relationships.

This paper explores how corruption has evolved into a covert yet integral part of global marketing strategy, challenging the ethical foundations of international business and calling for renewed attention from policymakers, marketers, and scholars alike.

Corruption is not an accidental activity. People in companies seldom if ever corrupt using their own personal resources, Therefore, corruption with company money is at best undetected, more frequently supported and approved internally, fined to do so, for the company to cut corners and obtain undue and unfair advantages over competitors. Management - far from being morally neutral - is complicit in these activities with an unethical culture of performance at all costs.

Originality of the paper. *We propose to include illegal marketing represented by corruption activities as a 5th P of the marketing mix, the illegal Payoff aspect, always denied but widespread in practice***.** *The future of international marketing lies not just in communicating value, but in actively creating ethical value. To do so, marketing must move beyond compliance rhetoric and adopt a transformative function within the organization. Anti-corruption literacy in business education and marketing training is underemphasized, in stark contrast with the relevant corruption scandals that abound. More attention to corruption dynamics in marketing by academia and practitioners could really have a*

transformational effect on marketing, reframing international marketing activities from potentially law infringing behaviours to a truly sustainable ethical driver .

This paper has highlighted the often-ignored role of corruption as both a barrier and a tool in international marketing. By examining the systemic, involvement of marketing in private and public sector corruption, it becomes clear that international marketing does not operate in a vacuum-it is both a mirror and a mold of institutional integrity.

This is the first comparative analysis of four different corruption measurement indices, to assess the consistency of perceptions and actual occurrence of corruption incidents in public and private activities. It shows relevant asymmetries between countries, confirming that bribe payers are not sufficiently exposed in comparison with the negative impact they have on market transparency and fair trade, effectively distorting - or attempting to influence - their commercial results in third countries in their favour.

Cluster analysis carried out to group European countries in different groupings linked to their positioning in the four indices chosen and the relative discrepancies between them shows that countries with a high discrepancy index require greater transparency and demonstrable impact to restore trust. Meanwhile, high-performing clusters offer models for ethical value-based marketing.

This study provides empirical grounding for to shift focus away from oversimplified, country-level indices and toward sector-specific, firm-level, and organizational analysis. Only then can we begin to understand and confront the structural role of corruption in international marketing practice and more broadly in business.

Key words: *Corruption, Competitiveness, International Marketing, Compliance, Sustainability,*

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Exploring the Role of Cultural Intelligence in Career Sustainability: A Multi-Industry Comparative Study

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Abstract

The concept of sustainable careers has gained increasing attention. Some recent studies proposed a framework which identifies happiness, health, and productivity as core dimensions of career sustainability and spirituality. While previous research has examined Cultural Intelligence in the context of the airline industry, particularly in Intercultural Service Encounters, little is known about how Cultural Intelligence contributes to career sustainability across various industries. This study seeks to extend the existing research by conducting a multi-industry comparative study, investigating the role of Cultural Intelligence in fostering career sustainability across service-oriented industries. It provides preliminary insights into how individuals, organisations, and national culture interact to shape sustainable careers in Intercultural Service Encounters settings.

Key words: *Sustainable careers, Cultural Intelligence, Intercultural Service Encounters, Career Ecosystem, Cross-Industry Comparison.*

Framing of the research

Sustainable Careers

Sustainable careers represent sequences of career experiences that ensure ongoing employment and facilitate personal development, adaptation to change, and individual and organizational resilience over time (Van der Heijden et al., 2020; De Vos et al., 2020). Initially introduced by Van der Heijden and De Vos (2015), the concept underscores dynamic alignment between individual capabilities, organisational roles, and contextual factors, emphasizing mutual benefits and adaptability. The sustainable career model delineates three primary dimensions: health, happiness, and productivity (De Vos et al., 2020).

Health encompasses the alignment of careers with physical and psychological wellbeing, emphasizing that career decisions must account for physical demands such as those experienced by healthcare workers, and psychological stressors prevalent in high-demand roles, potentially leading to burnout (Khamisa et al., 2016; Bernal et al., 2015).

Happiness refers to subjective assessments of career success, rooted in how careers align with personal values and broader life satisfaction (Sheldon et al., 2002). Happiness in careers is dynamic and must continually realign with evolving life circumstances, indicating the importance of ongoing career reassessment.

Productivity covers current job performance and future employability, crucial for career longevity. Adaptation to changing organisational needs and job demands is essential, reflecting career adaptability and resilience to external disruptions like technological changes or economic downturns (De Vos et al., 2020).

Recent studies have explored sustainable careers from diverse angles, such as the role of reduced-load work arrangements in maintaining career sustainability through balanced workload management (Kossek & Ollier-Malaterre, 2024). Research by Straub, Vinkenburg, and Van Kleef (2020) examines career customization, noting that flexibility in workload and job responsibilities can enhance career sustainability if aligned with individual and organisational needs. Conversely, Richardson and Mckenna (2020) explore the unsustainable aspects of careers in professional sports, highlighting unique social demands and resources that require strategic management for career transitions.

Cultural Intelligence (CQ)

Cultural intelligence, crucial in global workplaces, facilitates effective performance in intercultural interactions by enhancing intercultural understanding and adaptability (Ang et al., 2007; Van Dyne et al., 2008). CQ comprises four core dimensions: metacognitive, cognitive, motivational, and behavioural (Ang et al., 2007).

Metacognitive CQ involves high-level strategies enabling continuous revision of assumptions about cultural interactions, essential for adjusting behaviours in culturally diverse situations (Ang et al., 2007; Triandis, 2006). Cognitive CQ covers explicit knowledge about cultural practices, facilitating informed intercultural communication and interaction (Van Dyne et al., 2008). Motivational CQ reflects an individual's willingness to engage with cultural diversity,

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crucial for sustained career engagement and adaptability. Behavioural CQ involves demonstrating culturally appropriate behaviours, facilitating effective intercultural communication and performance (Van Dyne et al., 2008).

Tungtakanpoung and Prouska (2024) underscore the strategic role of CQ within ICSEs-intensive industries, linking enhanced CQ competencies with increased career sustainability through superior customer satisfaction and employee adaptability. Similarly, Lin, Zhang, and Gursoy (2021) validate CQ as directly contributing to improved performance and customer satisfaction, further supporting the importance of embedding CQ training within organisational practices to foster career longevity.

Cultural Intelligence and Career Sustainability

Research increasingly emphasizes CQ's integral role in career sustainability, especially within industries characterized by significant intercultural interaction. Studies suggest high CQ facilitates overcoming intercultural barriers, thus directly impacting job performance, employability, and career satisfaction. Additionally, cross-cultural competency training, when aligned with organisational practices, significantly enhances career sustainability by preparing employees for dynamic intercultural demands (Lin, Zhang, & Gursoy, 2021).

Further, Tungtakanpoung & Prouska (2024) integrate CQ into career sustainability frameworks, demonstrating that cultural adaptability can lead to enhanced career success by supporting sustained employability and resilience in diverse cultural contexts. They advocate a holistic approach, embedding CQ within broader HR strategies aimed at long-term career development.

This comprehensive review of sustainable career and cultural intelligence literature illustrates the critical interplay between individual competencies, organisational policies, and broader societal influences in facilitating career sustainability across diverse industries. Based on previous research, the findings suggest that CQ significantly influences career sustainability across different service-oriented industries by enhancing individual performance and adaptability in intercultural contexts. Service employees with high CQ competencies demonstrated greater effectiveness in managing intercultural interactions, leading to increased customer satisfaction, improved personal job satisfaction, and sustained employability. Industry-specific variations revealed nuanced differences in how CQ competencies are valued and developed within organisational cultures and across different national contexts. These findings expand upon existing models by highlighting the specific ways CQ facilitates sustainable careers in diverse industries, reinforcing the critical role of cultural adaptability.

Industry-Specific Insights

Intercultural Service Encounters (ICSE) is a specific form of service encounter where providers have a different cultural background to receivers (Gutek, 1999; Gutek et al., 2002; Delcourt et al., 2013; Gaur et al., 2017; Lorenz et al., 2017; Vrontis et al., 2021). ICSEs have increased greatly due to globalization which accelerated goods and services customer interactions (Sharma et al., 2009; Tam et al., 2014, 2016).

These encounters are prevalent in various industries where cross-cultural communication and understanding are essential for delivering effective and satisfactory service. Below are the key industries related to ICSEs:

Industry	**Examples of Intercultural Service Encounters (ICSEs)**
Hospitality and Tourism	Hotels, restaurants, travel agencies, airlines
Retail and E-Commerce	International retail chains, luxury goods, e-commerce platforms
Healthcare	Hospitals, telemedicine, pharmaceuticals
Education	International schools, language schools, study abroad programs
Financial Services	Banks, insurance companies, fintech
Technology and IT Services	Customer support, software development, tech retail
Transportation and Logistics	Ride-sharing services, shipping/delivery services, public transportation
Entertainment and Media	Film and television production, live events, streaming platforms
Real Estate	International property sales, hospitality real estate, relocation services
Non-Profit and Social Services	International NGOs, community services, cultural exchange programs
Legal and Consulting Services	International law firms, management consulting, immigration services
Automotive	Car dealerships, ride-hailing services, automotive manufacturing
Fashion and Beauty	International fashion brands, cosmetics, fashion events
Sports and Recreation	International sports events, fitness centers, adventure tourism
Telecommunications	Customer support, mobile services, internet service providers

Even though definitions on ICSE abound, a consensual definition of ICSE by Stauss and Mang (1999, p. 331), states: "service encounters are inter-cultural if the service provider and customer belong to different cultures".

Several scholars emphasize that ICSEs are complex ibecause they involve intergroup and interpersonal facets (Wang and Mattila, 2010). This complexity may cause misunderstanding, resulting in frustrated service providers, dissatisfied customers, and, ultimately, loss of business (Wang and Mattila, 2010).

A comprensive review on ICSE by Vrontis et al. (2021), highlight many studies state that, even if there are different definitions adopeted with regard to culutral competence and intercultural competence, such as intercultural sensitivity, intercultural effectiveness, and cultural intelligence, all suggest that this kind of competence influences intercultural interactions Sharma et al. (2009). Even though it is a theory that connect directly with ICSEs, only a small number of the studies mention it (i.e. Sharma et al., 2009, 2012, 2016).

Purpose of the paper. *The sustainability of careers has emerged as a significant area of scholarly interest due to rapidly evolving global economic environments and increasing intercultural workplace interactions. The concept of sustainable careers emphasises continuous employment in roles that facilitate personal development and adaptivity to external changes, thereby securing longevity and satisfaction for individuals and productivity for organisations (Van der Heijden et al., 2020). Cultural Intelligence (CQ), specifically, has been highlighted as pivotal in enhancing career sustainability, especially within occupations characterised by intercultural service encounters (ICSEs) (Tungtakanpoung & Prouska, 2024). However, existing research largely focuses on singular industries, notably airlines, leaving gaps concerning other service-oriented sectors. This study aims to bridge this gap by exploring the impact of CQ on sustainable careers across multiple industries, incorporating various national cultural contexts.*

This research integrates the Career Ecosystem theory (Baruch & Rousseau, 2019), the sustainable careers framework (De Vos et al., 2020, Tungtakanpoung & Prouska., 2024). Career Ecosystem theory posits that career sustainability is shaped through interactions between individuals, organisations, and broader national cultural contexts. Thus, sustainable career practices require alignment across these multiple dimensions, highlighting shared responsibility between employers and employees (Donald et al., 2024). Cultural Intelligence significantly impacts career sustainability through productivity, particularly in ICSEs-intensive occupations. Employees with high CQ demonstrate an enhanced ability to overcome cultural barriers such as language or behavioural misunderstandings, thereby offering superior service experiences (Lin, Zhang & Gursoy, 2022). Such competence directly impacts their performance and productivity, pivotal for sustaining long-term careers in ICSE contexts.

The present study adopts a multi-industry approach, examining sectors beyond airlines, to understand variations in CQ's influence across different industries. Preliminary ethnographic research conducted in Thai Airways underscores the significance of CQ in performance and customer service interactions (Tungtakanpoung & Prouska, 2024). Expanding upon this, the study aims to uncover variations in the impact of CQ on career sustainability across broader service industries, emphasizing intercultural interactions as common denominators.

Methodology. *This study employs ethnographic qualitative methodologies, encompassing in-depth semi-structured interviews and critical incident techniques across multiple national contexts. This approach ensures a comprehensive understanding of the practical implications of CQ on sustainable career practices in intercultural settings.*

This study employs an ethnographic qualitative methodology, combining in-depth semi-structured interviews, critical incident techniques (CIT), and participant observations across multiple cultural contexts. The ethnographic component involved immersive engagement within selected organizational settings to observe ICSEs and understand the lived experiences of service employees.

A total of 30 interviews were conducted, with 10 participants from each of the hospitality, healthcare, and education sectors. Data collection occurred over a six-month period from March to July 2025, across two countries: the UK and Italy. Critical incidents were classified using Flanagan's (1954) method and further analyzed based on their frequency, perceived impact on career sustainability, and relevance to the four CQ dimensions. Incidents were weighted according to their reported influence on the participant's health, happiness, or productivity—aligning with De Vos et al.'s (2020) sustainable career dimensions.

Thematic analysis followed Braun & Clarke's (2013) guidelines. Transcripts will be coded for reliability. Each critical incident was mapped to the corresponding CQ competencies (metacognitive, cognitive, motivational, behavioural) and cross-verified against industry-specific factors and cultural context.

Data collection involves semi-structured interviews and critical incident in service industries across multiple national contexts. The ethnographic approach enables researchers to observe and document intercultural interactions and the application of CQ competencies, facilitating a deep understanding of how these competencies impact career sustainability.

Semi-structured interviews: Conducted with service employees across different sectors to explore their experiences and perceptions related to CQ competencies and career sustainability.

Critical Incident Technique: Researchers immerse themselves within the environments, noting interpersonal interactions, behaviors, and practices related to CQ through integrated CIT to the interview.

The collected qualitative data is analysed using thematic analysis to identify recurring patterns and themes related to CQ and career sustainability. Transcripts and observational notes are coded and categorised to facilitate thematic analysis (Braun & Clarke, 2013).

Semi-structured interviews incorporating the CIT were conducted to elicit critical incidents from participants. Participants were prompted to recall specific intercultural encounters that substantially impacted their career sustainability, either positively or negatively. Example interview questions included: "Can you share a specific incident

where your cultural intelligence significantly influenced your career sustainability or intercultural effectiveness?" (Viergever, 2019).

Additionally, critical incident techniques within the workplace environments provided contextual richness, capturing naturally occurring behaviours, interactions, and emotions during intercultural encounters (Robson, 2011). This will provide deeper insights into organisational culture and practices.

The collected qualitative data is analysed using thematic analysis to identify recurring patterns and themes related to CQ and career sustainability. Transcripts and observational notes are coded and categorised to facilitate thematic analysis (Braun & Clarke, 2013).

Research Questions

1. *How does cultural intelligence influence performance and career sustainability in industries characterized by high levels of intercultural service encounters (ICSEs)?*
2. *How does the impact of cultural intelligence on career sustainability vary across different industries and national cultural contexts?*
3. *How do individuals, organizations, and national culture interact to shape sustainable careers within ICSE settings?*

These two methods involve combining multiple methods or data sources to enhance the validity and richness of research findings (Robson, 2011). In this study, semi-structured interviews and critical incident techniques provided insights into individual perceptions, emotional manifestations, and organizational behaviour across different cultural contexts. Interviews illuminated employee perspectives on organizational policies and career experiences, while CIT facilitated an understanding of employees' emotional and behavioural expressions during intercultural interactions.

Ethnography provides a deep understanding of social behaviours and the significance individuals ascribe to them through immersive engagement and detailed CIT (Hammersley & Atkinson, 2019). This method is particularly suited to studying ICSEs, offering insights into real-life contexts, interactions, and the complex dynamics of cultural intelligence within organisational settings.

Semi-Structured Interviews

Semi-structured interviews allowed the exploration of in-depth individual experiences, attitudes, and perceptions about CQ competencies and sustainable career practices (Robson & McCartan, 2016). Interviews were designed to enable flexibility, permitting respondents to elaborate on issues important to their intercultural work experiences. The sessions were recorded and transcribed, providing accurate documentation of responses and facilitating detailed thematic analysis.

Samples-Semi-structured Interview

This research employs a qualitative, ethnographic approach to explore how cultural intelligence (CQ) influences career sustainability within Intercultural Service Encounters (ICSEs) across the hospitality, healthcare, and education industries. A triangulated methodological framework was adopted, integrating semi-structured interviews, participant observations, and secondary data analysis, to obtain a comprehensive understanding of intercultural interactions and their implications for sustainable careers (Robson, 2011).

Semi-Structured Interview Questions Linked with Research Questions and Literature

INTERVIEW QUESTIONS	LINKED RESEARCH QUESTION(S)	LINKED LITERATURE
DEMOGRAPHIC AND BACKGROUND INFORMATION:		
1. Could you briefly describe your current role and your industry (hospitality, healthcare, or education)?	Contextual understanding	Contextual information
2. How long have you worked in intercultural service encounters (ICSEs)?	Contextual understanding	Contextual understanding
CULTURAL INTELLIGENCE (CQ):		
3. Can you share an experience when cultural intelligence significantly impacted your performance in intercultural interactions?	RQ1, RQ2	Lin, Zhang & Gursoy (2021); Tungtakanpoung & Prouska (2024)
4. How do you prepare yourself to interact effectively in culturally diverse environments?	RQ1	Ang et al. (2007); Van Dyne et al. (2008)
5. Which CQ competency (metacognitive, cognitive, motivational, behavioral) do you feel most influences your intercultural effectiveness?	RQ1, RQ2	Ang et al. (2007); Van Dyne et al. (2008)
6. How does your organization support the development of your cultural intelligence competencies?	RQ3	Donald et al. (2024); Lin, Zhang & Gursoy (2021)
CAREER SUSTAINABILITY:		
7. How does cultural intelligence contribute to your overall job satisfaction and career sustainability?	RQ1, RQ3	De Vos et al. (2020); Van der Heijden et al. (2020)
8. What challenges do you face in maintaining career sustainability in your role, particularly related to ICSEs?	RQ2, RQ3	Van der Heijden et al. (2020); De Vos et al. (2020)

INTERVIEW QUESTIONS	LINKED RESEARCH QUESTION(S)	LINKED LITERATURE
9. How critical is cultural adaptability to your long-term career success?	RQ1	Lin, Zhang & Gursoy (2021); Tungtakanpoung & Prouska (2024)
INTERACTIONS BETWEEN INDIVIDUALS, ORGANIZATIONS, AND CULTURE:		
9. Could you provide examples of how national culture influences employee interactions and organizational practices in your workplace?	RQ3	Baruch & Rousseau (2019); Donald et al. (2024)
10. In what ways do organizational policies help or hinder the development of intercultural competence and sustainable careers?	RQ3	Donald et al. (2024); Van der Heijden et al. (2020)
RECOMMENDATIONS AND INSIGHTS:		
10. What recommendations do you have for enhancing intercultural competence training and career sustainability within your organization?	RQ3	Lin, Zhang & Gursoy (2021); Tungtakanpoung & Prouska (2024)
11. Do you have additional insights or recommendations regarding intercultural competence and career sustainability within your organization?	RQ1, RQ3	Tungtakanpoung & Prouska (2024); Lin, Zhang & Gursoy (2021)

Critical Incident Technique (CIT)

The Critical Incident Technique, originally described by Flanagan (1954), is employed to specifically identify factors, events, behaviors, or experiences that significantly help or hinder effective intercultural performance and career sustainability. CIT's methodological framework aligns closely with the study's aim, focusing explicitly on critical incidents in intercultural contexts that influence career productivity, satisfaction, and overall sustainability (Viergever, 2019). The CIT provides structured steps for data collection, analysis, and interpretation, ensuring consistency and depth of qualitative inquiry.

Data Analysis

The collected qualitative data underwent thematic analysis, following CIT's structured analytical process, which involved identifying and categorizing critical incidents into meaningful clusters or themes (Viergever, 2019).

This process entailed:

1. *Detailed review and coding of transcribed interviews and CIT from the interview notes to identify critical incidents.*
2. *Grouping similar incidents to form categories reflecting specific CQ competencies and their impacts on career sustainability.*
3. *Evaluating and interpreting categories to understand their implications within the broader context of ICSE and career sustainability.*

Thematic analysis highlighted recurring patterns and relationships among CQ competencies (metacognitive, cognitive, motivational, behavioral) and their role in enhancing productivity, adaptability, and satisfaction within intercultural environments.

Data collected through interviews, CIT analysis underwent thematic analysis using open coding methods (Strauss & Corbin, 1998). Open coding facilitated identification and categorization of recurring themes and patterns regarding the role of CQ in shaping sustainable career outcomes. The analysis process focused on discovering connections between individual behaviors, organizational support systems, and national cultural influences.

Validity and Reliability

To ensure methodological rigor, the methodology approach was employed across the semi-structured interviews, and CIT enhancing the validity and reliability of the findings (Robson, 2011). This approach ensured comprehensive cross-verification of critical incidents and minimized potential researcher bias. The qualitative methods significantly enhanced the study's validity by enabling cross-verification of findings (Robson, 2011). The consistent alignment across different data sources provided robust confirmation of the emerging themes and reinforced the reliability of the conclusions drawn.

Ethical Considerations

Participants' informed consent was secured prior to data collection, ensuring confidentiality and anonymity in the reporting of critical incidents. Ethical approval was obtained in line with institutional guidelines to safeguard participant welfare.

Results. *Initial insights will highlight that CQ competencies significantly enhance employee adaptability and resilience in intercultural contexts, directly influencing productivity. Employees proficient in CQ competencies demonstrate increased adaptability to cultural variability, resulting in heightened service quality and customer satisfaction. This enhances career sustainability through improved health, happiness, and productivity dimensions, underscoring the strategic value of developing CQ competencies within employee training and development frameworks across diverse service-oriented industries.*

Theoretical Implications. *This study contributes theoretically by extending the sustainable career and Career Ecosystem frameworks into underexplored sectors, specifically healthcare, hospitality and education, in contrast to previous airline-focused research (e.g., Tungtakanpoung & Prouska, 2024). It highlights that CQ's influence on career*

sustainability varies by sector: for example, motivational CQ played a stronger role in healthcare settings due to emotional labour demands, while behavioural CQ was more salient in education due to classroom adaptability needs.

Furthermore, this research introduces a comparative cross-industry and cross-national perspective rarely addressed in the ICSE literature, revealing how national cultural norms (e.g., hierarchical vs egalitarian organisational structures) modulate the effect of CQ on career outcomes.

Managerial implications. *Practically, findings advocate for organisational investment in CQ training as an integral component of career development programs. Such initiatives could enhance employees' career longevity and satisfaction, aligning organisational sustainability objectives with employee career aspirations. HR policies should prioritize developing CQ competencies, particularly in service-intensive industries involving frequent intercultural interactions.*

Specifically, the findings offer sector-specific recommendations. In healthcare, training should focus on developing motivational CQ to enhance resilience and retention in emotionally intensive roles. In hospitality, behavioural CQ development can improve service consistency in diverse guest interactions. Educational institutions may benefit from cognitive CQ training to help educators adapt pedagogical strategies to multicultural classrooms. For multinational organisations, aligning HR development strategies with national cultural contexts is essential. For instance, Thai employees valued CQ training integrated into team-based learning, while UK-based participants preferred self-directed development modules. This suggests that one-size-fits-all CQ programs may be ineffective across borders.

Research limitations. *The study extends sustainable career frameworks by explicitly integrating CQ competencies within the Career Ecosystem theory. It underscores the need for systemic integration of individual capabilities, organisational support, and national cultural influences in career management practices, thus enriching the theoretical understanding of career sustainability.*

Originality of the paper. *This study offers significant theoretical advancements and actionable insights by clarifying the role of Cultural Intelligence in sustainable career ecosystems. It bridges a critical gap by examining multiple service industries and highlights CQ's essential role in facilitating productive intercultural interactions, thus promoting career longevity. The multi-industry and cross-cultural comparative lens adopted here provides both theoretical clarity and practical guidance, essential for stakeholders in today's globalised employment landscape. By exploring CQ's impact on performance and career sustainability across different service industries, this research will offer both theoretical advancements and actionable insights for individuals and organisations seeking to foster long-term career success in intercultural work environments.*

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The impact of country image evaluations on consumer perceptions of brand sustainability and willingness-to-pay: Empirical evidence

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Abstract

Drawing on cue utilization theory, signaling theory, and attribution theory, we develop and test a model of the influence of country image evaluations on consumers' perceptions of brand sustainability and their willingness-to-pay (WTP) for a brand, both under the presence and the absence of a sustainability label. We find that both country image and the presence of a label (1) have independent effects on perceptions of brand sustainability, (2) positively impact WTP, and (3) consumer skepticism about sustainability claims also influences perceptions of brand sustainability and - through it - WTP.

Framing of the research. *There is little doubt that the importance of sustainability - in terms of economic, social, and environmental aspects (Elkington, 1984) - is increasing: consumers are seeking sustainable products (e.g., Whelan and Kronthal-Sacco, 2019), companies are implementing various sustainability initiatives (e.g., Chernev and Blair, 2021), and countries are actively promoting sustainable development (e.g., Dekhili et al., 2021). In this context, country-of-origin (COO), namely "the country which a consumer associates with a product or brand as being its source, regardless of where the product is actually produced" (Jaffe and Nebenzahl, 2006, p.29) has been shown to influence consumers' evaluations of sustainable products (Cowan and Guzman, 2020). However, literature on the interplay between COO and sustainability with a specific focus on consumers' WTP as an outcome variable is both sparse and (highly) contradictory (Scrimieri et al., 2024). For example, Magnusson et al. (2015) found that consumers perceive corporate social responsibility (CSR) initiatives more positively when they are associated with COOs with a strong environmental reputation; this positive perception leads to a higher WTP for the products offered by these firms. However, according to Dekhili and Achabou (2015), while a favorable COO image has no impact on the WTP for an eco-labeled product, an unfavorable COO image has a negative impact on the WTP for the product. Montanari et al. (2023) supported Dekhili and Achabou's (2015) findings in the case of a favorable COO image (i.e., no effect on WTP) but found completely the opposite in the case of a less favorable COO image: WTP increased for the sustainable product when associated with the weaker COO.*

Focusing on WTP is important since it denotes the maximum price a consumer is willing to spend on a product or service, through a trade-off between perceived benefits and costs (Koschate- Fischer et al., 2012). WTP is, therefore, of substantial managerial relevance for the development of pricing strategies. While an increasing consumer inclination towards sustainable products and services has been noted (Elhoushy and Lanzini, 2021; Paul et al., 2016; Rosenbaum et al., 2022), there is also a documented discrepancy between the importance consumers claim to assign to sustainability and their actual buying decisions (Narayanan and Singh, 2023; Barbarossa and Pastore, 2015; Bangsa and Schlegelmilch, 2019). Consumers may indeed display positive attitudes towards sustainable products but whether they are also willing to pay higher prices to obtain them is a question yet to be (unambiguously) answered.

Purpose of the paper. *In this study, we investigate how the image of the brand's COO (Roth and Romeo, 1992) and the presence/absence of information about the latter's sustainability (e.g., an eco-label on the product package) impact (a) consumer perceptions of brand sustainability, and (b) consumers' willingness-to-pay (WTP) for the focal brand. We do this by means of the model in Figure 1 which is general enough to apply to any COO and any aspect of sustainability (i.e., economic, social, or environmental). The conceptual underpinnings of our model are signaling theory (Erdem and Swait, 1998; Erdem et al., 2006; Erdem and Swait, 2016), cue utilization theory (Jacoby and Haddock, 1971; Olson, 1972; Olson and Jacoby, 1972), and attribution theory (Heider, 1958; Kelley and Michela, 1980; Folkes, 1988).*

Signaling theory (Erdem and Swait, 1998) states that firms convey information about their specific attributes, such as their reputation and product features, to gain a competitive advantage; in turn, consumers examine these signals when

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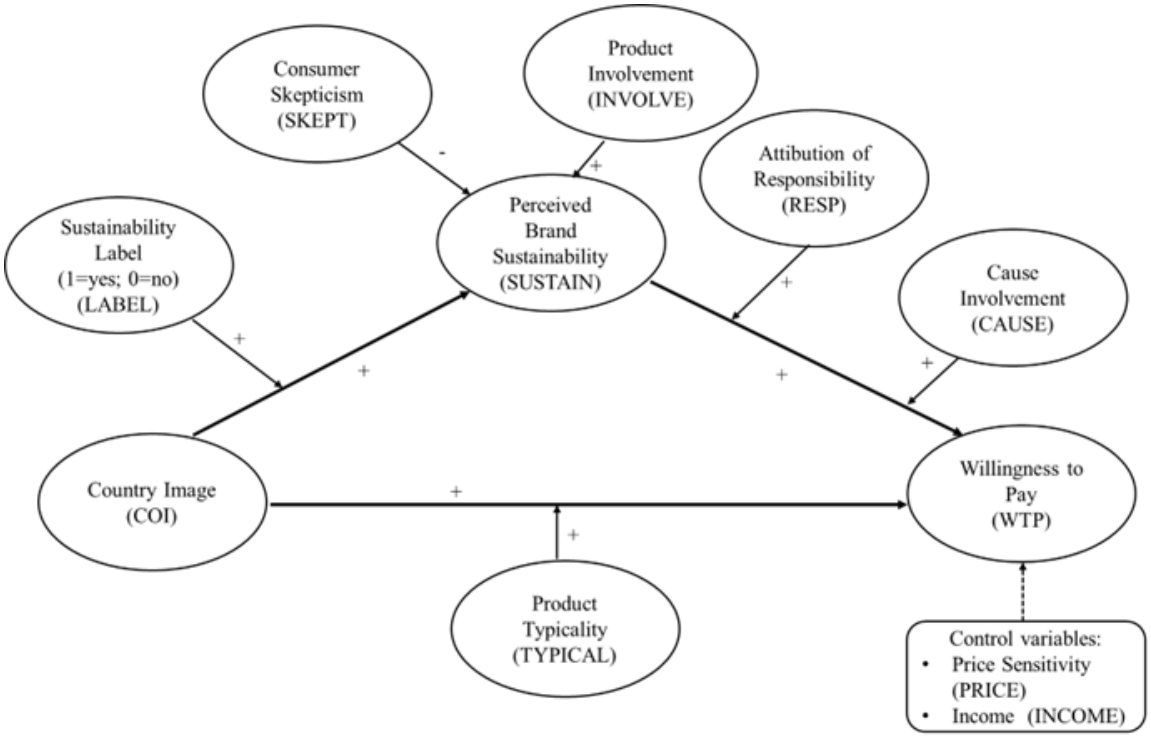
making purchasing decisions (Erdem et al., 2006). According to cue utilization theory (Richardson et al., 1994), COO and sustainability labels are extrinsic cues that act as signals and influence consumer responses (e.g., Lu at al., 2016; Lee et al., 2020).

When a brand carries a sustainability label and originates in a country with a strong image, it is more likely that the brand will be perceived as being sustainable (since the sustainability cue is more credible). However, absence of a sustainability label does not necessarily mean that the consumer will conclude that the brand is not sustainable. This is because consumers may assume that the brand is sustainable because it originates in a country with a strong image. Conversely, when the image of the brand's COO is not evaluated favorably, the presence of a sustainability label does not guarantee that the brand will be perceived as being sustainable. This is because, according to signaling theory, the sustainability information conveyed to consumers may not be seen as being a credible signal, if the COO image is unfavorable.

Fig. 1: Conceptual framework



Source: own elaboration

From the above discussion, two important points become evident. First, consumer perceptions about a brand's sustainability are not solely formulated based on the presence of an explicit sustainability cue (e.g., an eco-label) but also implicitly influenced by the image of the brand's COO. Second, consumer skepticism towards sustainability claims also needs to be accounted for as a potential influence on brand sustainability perceptions. These issues are addressed by the model structure in Figure 1 by specifying country image evaluations as a predictor of brand sustainability perceptions and the presence (vs. absence) of a sustainability label as a moderator on this relationship. Consumer skepticism and product involvement are also as included further predictors of sustainability perceptions. The latter are likely to be negatively affected by skepticism and positively by product involvement (greater involvement is expected to lead to a more accurate product evaluation - including sustainability aspects).

Once consumers have processed the COO and sustainability signals and reached a conclusion about the brand's sustainability (or lack of), the question arises how they will react in terms of their WTP. Drawing on signaling theory and cue utilization theory, the (ceteris paribus) expectation would be that a brand perceived to be sustainable and originating in a COO the image of which is favorably evaluated by consumers (two positive signals), would result in the highest WTP. Thus, as shown in Figure 1, the main effects from country image evaluations and brand sustainability perceptions on WTP are both expected to be positive. However, these effects are not expected to be invariant but conditioned by several factors as discussed below.

First, the effect from country image on WTP is expected to be positively moderated by product-country typicality (Tseng and Balabanis, 2011; Usunier and Cestre, 2007). When consumers consider the product to be highly typical of its COO, then a stronger impact of country image on WTP would be expected than when typicality is low.

Second, we expect the link between perceived brand sustainability and WTP to be conditioned by the attribution of responsibility (Folkes, 1984, 1988) and cause involvement (Hill and lee, 2015). Regarding the former construct, the relationship between perceived brand sustainability and WTP is likely to be stronger for those consumers who feel

personally responsible for (at least partly) covering the costs of sustainability and weaker for those that attribute the costs of sustainability to others (such as governments, institutions, or companies). Regarding cause involvement, this refers to the extent to which consumers perceive a cause as personally relevant to them (Grau and Folse, 2007). When consumers perceive a brand as highly sustainable and feel personally involved in environmental or social causes, they are more likely to reveal a higher WTP for the brand.

Note that to avoid overestimation of the effects of country image and brand sustainability on WTP, we include price sensitivity (Wakefield and Inman, 2003) and the consumer's (net) monthly income as control variables in our model.

Methodology. *To test our model, an experimental study was conducted in Italy using a between-groups design, whereby each participant was randomly exposed to a (fictitious) chocolate brand originating in Denmark, either with or without a sustainability (Fairtrade) label; the latter is widely used in this product category. The experiment was run with the fictitious brand L3B as product stimulus to minimize the potentially confounding effect of brand equity of already established brands (Dimofte et al., 2008) and have as few spontaneous COO associations as possible (Diamantopoulos et al., 2021). We opted for Denmark as the focal COO as it ranks 3rd in in the Sustainable Development Report (SDR, 2024) and thus its country image could be expected to influence consumer perceptions of sustainability of its products/brands.*

A total of 298 ordinary consumers (MAge =33.72, SDAge =11.01; 49.7 % male) participated in an online survey via the crowdsourcing platform Prolific (www.prolific.com[5]). Following exposure to the experimental stimuli, respondents evaluated four price points in Euros ('too cheap,' 'cheap,' 'expensive,' and 'too expensive') using Van Westendorp's (1976) Price Sensitivity Meter (PSM). To calculate WTP, the average of the "expensive" and "too expensive" price points was first computed (see Ceylana et al., 2014; Diamantopoulos et al., 2021). The resulting value was then weighted by the participants' likelihood of purchase; the latter was measured on a scale ranging from "0% = I would definitely not buy" to "100% = I would definitely buy" based on Juster (1966) and subsequently re-calibrated into probabilities. This adjustment produces a more realistic estimate of WTP since it explicitly takes the intention to buy the product into account (He et al., 2024).

Participants also completed multi-item scales measuring country image (Roth and Romeo, 1992), perceived brand sustainability (adapted from Gershoff and Frels, 2015), consumer skepticism (adapted from Obermiller & Spangenberg, 1998), product category involvement (Mittal and Lee, 1988), attribution of responsibility (Montanari et al., 2023), cause involvement (Hill and Lee, 2015), product-origin typicality (Halkias and Diamantopoulos, 2020) and price sensitivity (Wakefield and Inman, 2003)[6]. Finally, respondents provided standard demographic information.

Results. *We employed SmartPLS4 (Ringle et al, 2024) with 10,000 bootstrap resamples to estimate the model in Figure 1 and test the various relationships of interest. Tables 1 and 2 summarize the results.*

Tab. 1: Measurement Properties (Multi-item Scales)

	Loadings	***Cronbach's Alpha***	***Composite Reliability***	***AVE***
Country Image (COI)	*0.789-0.880*	*0.849*	*0.899*	*0.689*
Consumer Skepticism (SKEPT)	*0.821-0.904*	*0.915*	*0.936*	*0.747*
Product Involvement (INVOLVE)	*0.881-0.946*	*0.905*	*0.937*	*0.832*
Perceived Brand Sustainability (SUSTAIN)	*0.919-0.966*	*0.958*	*0.969*	*0.888*
Product-Country Typicality (TYPICAL)	*0.912-0.939*	*0.949*	*0.963*	*0.867*
Cause Involvement (CAUSE)	*0.567-0.907*	*0.903*	*0.911*	*0.676*
Price Sensitivity (PRICE)	*0.921-0.923*	*0.823*	*0.919*	*0.850*

As Table 1 shows, our construct measures display highly satisfactory psychometric properties. Cronbach's alpha and composite reliability (CR) well exceed the common 0.70 threshold; average variance extracted (AVE) for all constructs is above 0.50 (Hair et al., 2020); and all heterotrait-monotrait (HTMT) ratios are much lower than the 0.85 critical threshold (the highest comes to 0.596) offering strong evidence of discriminant validity (Henseler et al., 2015).

[5] A total of 306 individuals responded to the survey but 8 were subsequently excluded due to failing attentions check, non-transitive PSM responses, or extreme WTP values.

[6] In addition, participants in the experimental condition featuring a sustainability label, were asked to indicate their familiarity with the Fairtrade label; the majority (65.10%) accurately associated this label with social and environmental concerns.

Tab. 2: Parameter Estimates and Indirect Effects

	Estimate	p-value	95% BCI
Direct Effects			
COI --> SUSTAIN (H1)	*0.328*	*0.000*	*0,218, 0,436*
LABEL -> SUSTAIN	*0.922*	*0.000*	*0.770, 1.066*
COI x LABEL -> SUSTAIN (H2)	*-0.005*	*0.952*	*-0.176, 0.165*
SKEPT -> SUSTAIN (H3)	*0.256*	*0.000*	*0.160, 0.352*
INVOLVE -> SUSTAIN (H4)	*0.087*	*0.076*	*-0.013, 0.184*
COO -> WTP (H5)	*0.174*	*0.006*	*0.048, 0.300*
SUSTAIN -> WTP (H6)	*0.299*	*0.000*	*0.187, 0.390*
TYPICAL -> WTP	*0.070*	*0.349*	*-0.087, 0.209*
COI x TYPICAL -> WTP (H7)	*-0.013*	*0.789*	*-0.132, 0.058*
RESP -> WTP	*0.036*	*0.460*	*-0.059, 0.133*
SUSTAIN x RESP -> WTP (H8)	*0.012*	*0.799*	*-0.077, 0.105*
CAUSE -> WTP	*-0.044*	*0.605*	*-0.199, 0.145*
SUSTAIN x CAUSE -> WTP (H9)	*-0.123*	*0.222*	*-0.267 0.152*
Indirect Effects			
COI-> SUSTAIN-> WTP	*0.098*	*0.000*	*0.052, 0.142*
LABEL-> SUSTAIN -> WTP	*0.275*	*0.000*	*0.165, 0.374*
COI x LABEL -> SUSTAIN -> WTP	*-0.002*	*0.950*	*-0.052, 0.049*
SKEPT -> SUSTAIN -> WTP	*0.076*	*0.000*	*0.038, 0.115*
INVOLVE -> SUSTAIN -> WTP	*0.026*	*0.082*	*-0.004, 0.056*
Control Relationships			
PRICE -> WTP	*-0.041*	*0.499*	*-0.155, 0.080*
INCOME ->WTP	*-0.073*	*0.118*	*-0.159, 0.027*

Abbreviations: COI=Country Image, LABEL=Sustainability Label, SKEPT=Consumer Skepticism, INVOLVE=Product Involvement, SUSTAIN=Perceived Brand Sustainability, RESP=Attribution of Responsibility, CAUSE=Cause Involvement, TYPICAL=Product-Country Typicality, PRICE=Price Sensitivity, INCOME=Net Monthly Income

Country image, the presence of a sustainability label, and (a lack of) consumer skepticism,[7] all positively influence consumer perceptions of brand sustainability (Table 2). Product category involvement has no significant effect while the presence of the label does not moderate the relationship between country image and sustainability perceptions. The model explains 48.2 % of the variance in perceived brand sustainability.

Perceived brand sustainability, in turn, has a positive influence on WTP thus resulting in positive indirect effects from country image and lack of skepticism. Since the direct effect from country image on WTP is also positive, this is a case of complementary mediation (Zhao, Lynch, and Chen 2010). The presence of a sustainability label also has a positive indirect effect on WTP as does lack of consumer skepticism. None of the expected moderating effects of product ethnicity, attribution of responsibility, or cause involvement turned out to be significant; nor did these variables have a direct influence on WTP. Regarding the control variables, neither income nor price sensitivity significantly influences WTP; 19.3 % of the variance in WTP is explained by the model.

A comparison of total effects on WTP reveals that country image (95% BCI: 0.133, 0.396) and the presence of a label (95% BCI: 0.165, 0.374) have similar impacts, while the influence of consumer skepticism is considerably less strong (95% BCI: 0.038, 0.115). Finally, the model has good (out-of-sample) predictive as indicated by a positive $Q^2_{predict}$ *value (= 0.067); RMSE (= 1.822) and MAE (= 1.169) values lower than those of the corresponding LM benchmarks (1.827 and 1.179 respectively); and a model average loss value (= 2.088) significantly lower than the relevant IA loss value (=2.557).[8]*

Research limitations. *Obvious limitations of the current study are the consideration of a particular product category, a single COO and a certain type of sustainability label. A further limitation is the focus on a particular COO notion, namely the brand origin, which also coincides with the country of manufacture in the current study. However, in many instances, the brand origin and the country of production are distinct, and this inevitably complicates the interrelationship between COO and sustainability cues, particularly if there is incongruence in the origins concerned.*

Managerial implications. *Our findings demonstrate the important role of country image evaluations in influencing consumer perceptions of sustainability as well as WTP. Thus, to capitalize on sustainability claims when developing price positioning strategies, marketing decision makers should consider consumer evaluations of the image associated with the brand's COO. They should further bear in mind that consumer skepticism will also influence brand sustainability perceptions and, through them, WTP. Whether the extra costs of sustainability are likely to be covered by consumers' higher WTP is, of course, another important issue that managers need to consider (but beyond the scope of the present study).*

Originality of the paper. *Our model provides a new theoretical lens on the impact of sustainability and COO cues on consumers' WTP and highlights the close interdependence of these cues. Prior sustainability research implicitly assumes that consumers who receive information about sustainability will automatically declare the brand as being*

[7] The scale consumer skepticism was adapted from Obermiller and Spangenberg (1998) and its items capture lack of skepticism; hence the positive sign of the relevant parameter.

[8] RMSE = Root Mean Square Error; MAE = Mean Absolute Error; LM = Linear Regression Model; IA = Indicator Average (naive benchmark). For details, see Shmueli et al. (2016, 2019) and Sharma et al. (2023).

sustainable, as result of which they would be willing to pay a higher price for it (e.g., Reimers and Hoffmann, 2019). Our model questions this "linear" process, as it does not (a) involve explicit measurement of consumers perceptions of brand sustainability, and (b) account for the perceived credibility of sustainability signals (as reflected in consumer skepticism). Indeed, the conflicting findings of prior empirical research on the simultaneous impact of COO and sustainability cues on WTP may well be (at least partly) due to the neglect of these factors in the relevant research designs.

Key words: *country-of-origin; sustainability; willingness-to-pay; empirical study.*

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Made in Italy effect: Exploring the relationship between Reshoring and Country of origin

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Abstract

The Italian fashion industry is experiencing a significant reshoring movement, driven by consumer demand for sustainability, regulatory pressures and the need to preserve the prestige of the "Made in Italy" label. This study explores the relationship between country of origin (COO) and reshoring decisions in luxury fashion, analyzing literature from 2020-2025. Findings indicate that reshoring strengthens brand heritage, enhances sustainability efforts, and improves consumer trust through digital transparency. The shift from offshoring to reshoring is fueled by changing consumer preferences, with Gen Z and eco-conscious buyers willing to pay premiums for ethical and sustainable products. Regulatory policies such as the EU Circular Economy Action Plan and the Decreto Internazionalizzazione further incentivize brands to relocate production. Additionally, luxury brands leverage reshoring to reinforce authenticity and mitigate supply chain risks. However, challenges such as labor shortages and limited digital adoption among SMEs persist. In particular, this research identifies three key themes: reshoring as a strategy to maintain brand authenticity, its role in sustainable production and the growing importance of digital transparency via blockchain. The study underscores reshoring's impact on consumer perception and luxury brand positioning, providing valuable insights for managers navigating the evolving landscape. This research contributes to the ongoing discourse on reshoring by examining its economic, environmental, and cultural implications. It highlights the necessity for continued investments in workforce training and digital innovation to ensure long-term success in the Italian fashion industry.

Framing of the research. *Italy and its foremost fashion centers are globally recognised for their exceptional craftsmanship, high-quality goods, luxurious brands and deep-seated cultural heritage. The "Made in Italy" label signifies superior craftsmanship, thus warranting elevated pricing and exclusivity. Because of globalisation, higher demand and the offshoring trend in the late 2000s, Italian brands shifted their manufacturing operations abroad to reduce costs and meet higher demand (Rune & Gummesson, 2023). The offshoring trend was followed by almost every Western country, but now the West is reconsidering its love affair with offshoring. In recent years, firms have been relocating value chains, especially the production of goods, back to their home countries or regions, which is called reshoring (Pedroletti & Ciabuschi, 2023; Robinson & Hsieh, 2016). The offshoring promise of low cost, efficiency and higher profits had reneged. Natural calamities, the COVID-19 pandemic, the Russia- Ukraine war, disruption of the global supply chain, and Trump's new tariff policies for the globe are pushing the world to rethink their offshore businesses (Antoinette Radford, 2025; The White House, 2025). The world is observing sustainability and ethicality in consumption patterns; hence, reshoring is not limited to profit and loss but includes resilience, transparency, craftmanship and affiliation for the country of origin (COO) (Gillani et al., 2023). In fashion, COO remains a potent driver to influence consumption (Diamantopoulos et al., 2011). Hence, consumer demand for ethicality, transparency and sustainability is influencing the reshoring decisions of the fashion industry (Dong et al., 2020). According to a US consumer sentiment survey (2020), 60% of consumers agreed to pay extra for sustainable packaging, and 78% chose a sustainable lifestyle over unconscious consumption. The usage of eco-friendly materials and ethical labor (recyclable polyester and organic cotton) is being prioritised by consumers. Which compels brands to reshore their business to align with consumer demand. Regulatory policies, i.e., the EU Circular Economy Action Plan, force fashion brands to reshore manufacturing facilities to comply with sustainability policies and avoid penalties (European Commission, 2022). Also, from a marketing perspective, the "Made in Italy" label creates a sense of luxury, quality and sustainability; hence, manufacturing in the home country would reinforce the "Made in" effect (Kaylyn Wenzel, 2022). Demographically speaking, Gen Z is seeking eco-friendly brand options and is willing to pay premium prices (Imran Amed, 2025). Also they are equipped with smartphones and are being bombarded with hashtags like ethicality, sustainability and eco-friendly fashion (Sustainable*

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Closet, 2022). According to PwC, consumers are willing to pay 9.7% more on average for sustainably produced goods because they have directly observed climate change in their lives (PwC, 2024). Consequently, businesses are thinking of reshoring to meet consumer demands.

Purpose of the paper. *Italy's fashion industry is experiencing a profound reshoring movement strategically designed to strengthen the prestige of the "Made in Italy" label while addressing long-standing vulnerabilities within the supply chain (Merlo & Pinchera, 2023). In the post-pandemic landscape, leading fashion brands are increasingly acquiring specialized subcontractors, such as tanneries and knitwear manufacturers, to reintegrate previously outsourced production stages. This shift not only ensures stricter quality control but also protects Italy's rich artisanal heritage amid an ongoing shortage of skilled labor.*

A crucial driver of this trend is the Decreto Internazionalizzazione (D.lgs. 209/2023), which offers substantial fiscal incentives to companies reshoring production from non-EU countries. Firms that relocate operations back to Italy benefit from a 50% tax reduction and a decade-long exemption on certain income taxes, making reshoring an economically compelling option (Decreto Internazionalizzazione", 2023).

However, economic factors alone do not fully explain this transition. Empirical studies indicate that 78% of Italian fashion firms prioritize the authenticity and craftsmanship of "Made in Italy" over cost efficiency, suggesting that reshoring is primarily viewed as a means to enhance brand value and consumer perception rather than merely a response to logistical challenges (De Giovanni Stefano Franco & Chitarrini Matr, 2023). Despite these advantages, challenges persist.

The adoption of blockchain technology, a critical tool for transparency and traceability, remains limited, particularly among small and medium-sized enterprises (SMEs) (Pedroletti & Ciabuschi, 2023). Additionally, certain regions such as Tuscany, face a shortage of highly skilled artisans, with luxury houses like Gucci and Prada competing intensely to secure talent (Pinchera & Rinallo, 2020). This labor deficit raises concerns about the long-term sustainability of Italy's reshoring efforts, especially given the aging workforce in the artisanal sector.

Luxury conglomerates are leading the reshoring charge, not only to enhance supply chain resilience but also to reinforce brand storytelling. LVMH's investments in Tuscan tanneries exemplify how major players are doubling down on provenance, using local production as a marketing differentiator (Donzé & Wubs, 2020). Furthermore, reshoring aligns with Europe's tightening sustainability regulations, compelling fashion brands to adopt more environmentally responsible production methods while preserving their unique heritage. Ultimately, Italy's fashion industry is redefining reshoring as a dual strategy: it serves both as a tool for brand differentiation, elevating the value of Italian craftsmanship, and as a means to comply with regulatory pressures on sustainability and ethical sourcing. As the industry evolves, the long-term success of this transition will hinge on continued investments in workforce training, digital innovation and sustainable practices to secure Italy's status as a global leader in luxury fashion.

Reshoring has been observed mainly in European countries due to strategic reasons, efficiency, a rapidly changing external environment and global politics. In the past, the reasons for offshoring business were almost the same as for reshoring of the same business today. Nonetheless, new variables have also been observed influencing reshoring decisions, i.e, sustainability, ethicality, governance and COO, but their impact/relationship is under-researched. Multiple studies are being conducted to understand drivers and barriers of reshoring decisions, but the outcome of reshoring compared to offshoring is a gap in the current research (Wiesmann et al., 2017). Also, Industry-wise (fashion, leather or furniture) reshoring motivators are under-researched. This paper is focused on reshoring drivers of the luxury fashion industry in particular. "Made in Italy" is a luxury label that denotes craftsmanship, culture and quality. A meta-analysis explored that COO positively influence perceptions of luxury brand evaluations as the image of the product country creates an impact on consumer decision making (Oduro et al., 2024). According to research, consumers associate Chinese products with low cost and low reliability, German Products with reliability, Japanese products with quality and French and Italian products with luxury and craftsmanship. Consequently, these associations influence purchase decisions of consumers when they spend money on luxury items, e.g. Luxury bags and Clothes. Hence, we are conducting this bibliometric analysis to find the relationship between "Made in Italy" and COO to suggest policies and explore its importance in terms of fashion reshoring. This work in progress analyzes current literature based on the relationship between Made in Italy and COO and how much it affects and influences consumer perceptions and behaviors. Accordingly, this study highlights the pros and cons of fashion reshoring and will benefit managers in taking calculative risks in terms of relocating their production (Pasquinelli, 2023).

Methodology. *The phrase "Made in Italy" in the fashion sector has undergone a significant transformation since 2020. It has shifted from simply indicating the origin of manufacturing to representing a dynamic cultural identity that highlights tradition, innovation and regional uniqueness. This study combines studies, market analyses and institutional research to illustrate this change in perception. It shows how global consumers currently view Italian fashion through three interconnected lenses: artisanal authenticity, storytelling in the digital age and sustainable value propositions.*

We have analyzed 90 papers published from 2020 to date. This study was conducted in two phases. During phase 1, we developed the research questions (RQ1 and RQ2), keywords, database and exclusion inclusion criteria. We propose the following research questions:

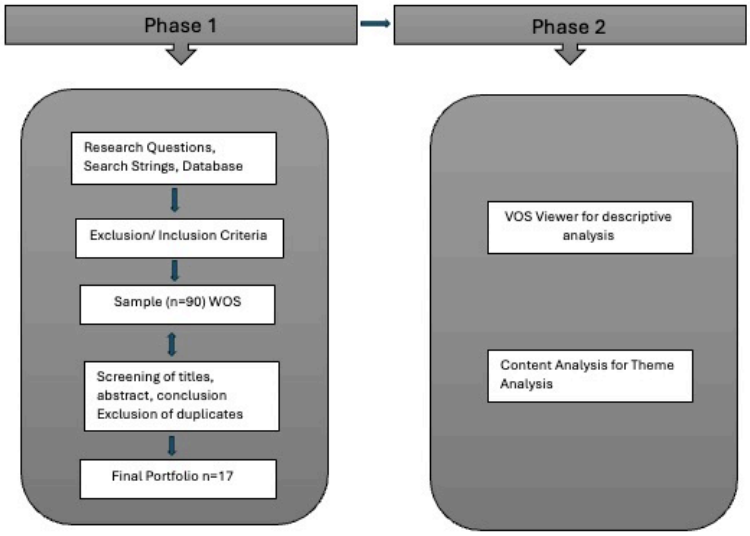
RQ1: Do Made in Italy and COO have a positive and strong relationship?

RQ2: Made in Italy and COO relationship can be a strong driver for reshoring decisions, why or why not?

Phase 2 referred to the content analysis of the articles retrieved.

The workflow is reported in Figure 1.

Fig. 1: Methodological workflow



Source: authors' elaboration

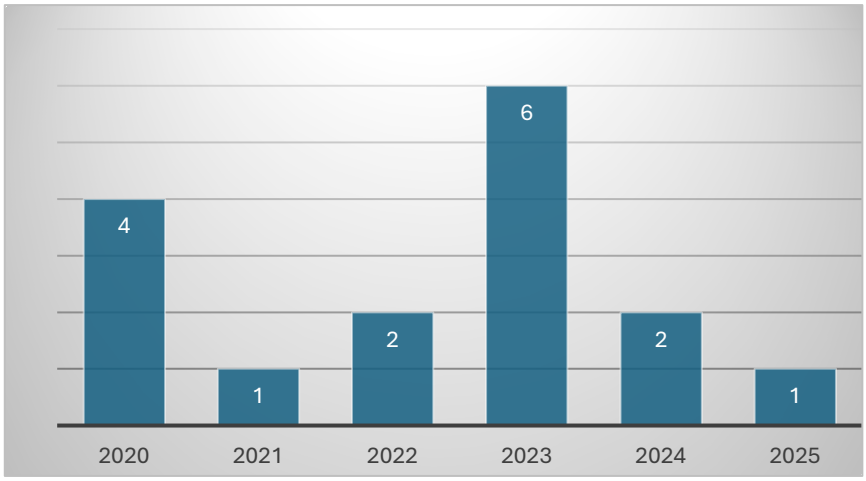
Phase 1 involved the definition of objectives for the literature review, the search string parameters, the database (Web of Science, Google Scholar and University theses database) and the exclusion criteria. The analysis of the publication in the encompassing years 2020 - present considered certain initial parameters like COVID-19 (2020), the Russia- Ukraine War (2021- present) and Made in Italy (MICS initiative 2023- present). The research was conducted solely in English, given its widespread global use and influence and the language of the published research under investigation. Consequently, the initial screening of studies employed the keywords "Sustainability" AND "Luxury Fashion," or "Sustainability" AND "Made in Italy" or "Made in Italy AND "Country of Origin" The searches were finished in Jan 2025. A total of 90 articles were retrieved from the database search. After screening out of irrelevant articles on the basis of abstract, study theme, relevance with Italian identity, we are left with 17 articles (this study is a work in progress). These articles include Master's Theses, Book chapters and Scientific articles.

The study involved a content analysis of 17 selected articles in Stage 1, utilizing the bibliometric software VOSviewer to examine authors, keywords (with at least five occurrences), and countries.

Results. *The "Made In" label serves as a critical heuristic for consumers to assess product quality, ethical practices, and cultural authenticity, particularly in the fashion industry. This review synthesizes 17 studies (2020-2024) to analyze how country-of-origin (COO) cues intersect with sustainability, reshoring and brand loyalty. Specifically, The trend of publications is reported in Figure 2, the main relevant sources in Figure 3, and the types of publications are reported in Figure 3. Key themes include regional disparities in COO perceptions, the luxury-fast fashion dichotomy and the moderating role of digital transparency.*

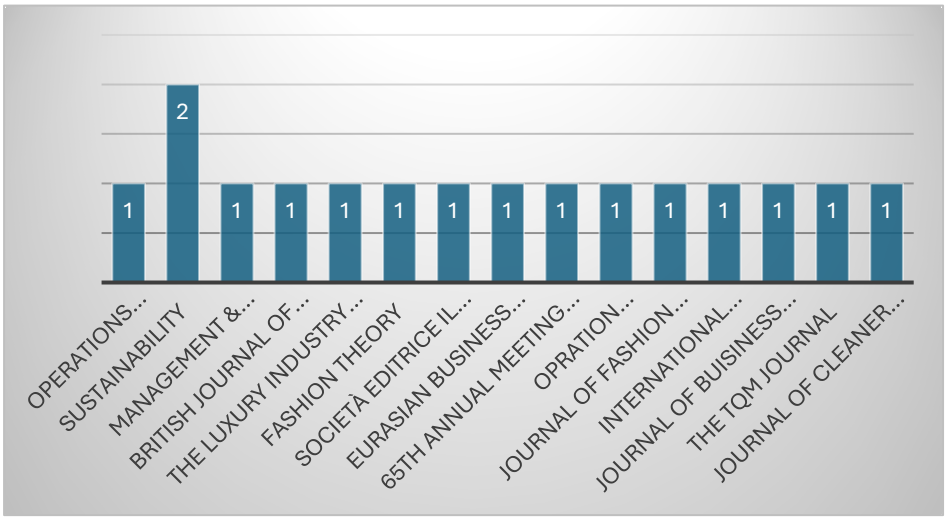
As for the thematic analysis, this study follows Braun & Clarke's six-step thematic analysis framework (Byrne, 2022): First, the selected studies were thoroughly reviewed multiple times to identify recurring patterns and key ideas. Second, an initial coding phase was conducted, categorising essential concepts such as "craftsmanship," "sustainability," "consumer trust" and "digital transparency" across the dataset. Third, these codes were grouped into broader themes that captured the relationship between reshoring and the country of origin (COO). Fourth, the identified themes were carefully reviewed and refined to ensure their relevance to the research question. Fifth, each theme was clearly defined and linked to specific insights drawn from the literature. Finally, the findings were synthesized into a coherent narrative, highlighting key trends and identifying gaps in the existing research.
The preliminary findings highlight three major themes:

Fig. 2: Publications per year (2020-2025)



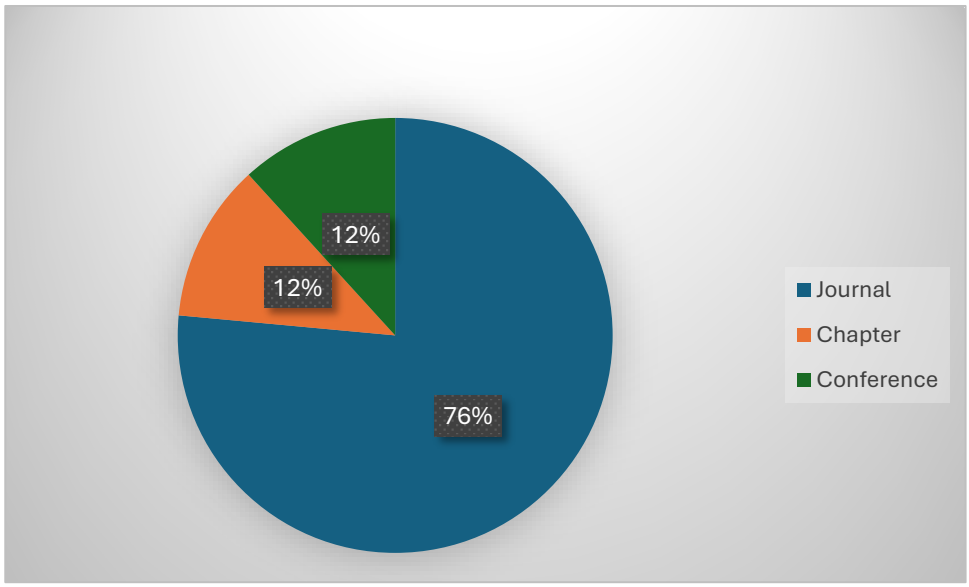
Source: authors' elaboration

Fig. 3: Most relevant sources



Source: authors' elaboration

Fig. 4: Types of publications



Source: authors' elaboration

The preliminary findings highlight three major themes:

- ***Theme 1*** *- reshoring as a means to strengthen brand heritage: reshoring is increasingly recognized as a strategy to protect and enhance COO narratives. For instance, Italian luxury brands have brought production back to Italy to preserve their "Made in Italy" heritage. Research suggests that consumers perceive domestic manufacturing as synonymous with high-quality craftsmanship, ethical labor standards and sustainability, all of which play a crucial role in influencing purchasing decisions. Additionally, reshoring helps mitigate risks associated with global supply chains, such as delays and geopolitical tensions, ensuring greater operational efficiency while reinforcing brand authenticity (Piancazzo et al., 2024).*
- ***Theme 2*** *- reshoring as a driver of sustainability: Consumer demand for sustainable practices is pushing brands to localize production. By shortening supply chains, reshoring helps reduce carbon footprints while allowing for greater oversight of ethical labor conditions. Many brands have integrated sustainability narratives into their COO labels, highlighting how localized production can significantly lower emissions compared to offshore manufacturing. Additionally, national, EU and international regulatory frameworks are increasingly promoting reshoring by enforcing stricter transparency requirements in supply chains and encouraging more sustainable production practices.*
- ***Theme 3*** *- digital transparency to improve COO trust: digital tools, such as blockchain-enabled digital product passports, are revolutionizing how brands authenticate COO claims. By providing verifiable tracking of materials and production processes, these technologies enhance consumer trust and reinforce brand authenticity. Studies have shown that implementing blockchain-based tracing systems can significantly improve consumer confidence in product origins. However, adoption remains uneven, with small-to-medium enterprises (SMEs) facing greater challenges in integrating these digital solutions due to resource constraints and technological barriers (Torregrosa et al., 2023).*

Research limitations. *Despite offering valuable insights into the relationship between reshoring, COO perceptions, and sustainability in the luxury fashion industry, this study has several limitations.*

First, while bibliometric analysis provides a structured understanding of key themes, it does not capture real-time industry shifts or the latest corporate strategies that may not yet be documented in academic literature. Therefore, a more comprehensive approach, incorporating primary data collection through interviews or surveys with industry experts and consumers, could offer a deeper, more nuanced perspective on reshoring decisions.

Second, the study focuses predominantly on Italy's luxury fashion sector, which limits its generalizability to other countries or segments within the fashion industry. While "Made in Italy" is a powerful branding tool, COO effects vary across different national contexts, making it challenging to extrapolate findings to markets such as France, the U.S., or emerging economies. Additionally, reshoring motivations in fast fashion or mid-market brands may differ significantly from those in luxury, where craftsmanship and exclusivity are more prominent drivers.

Third, the study emphasizes reshoring as a response to sustainability concerns, consumer demand and regulatory pressures. However, economic factors such as production costs, labor shortages and geopolitical risks also play a crucial role in reshoring decisions. The paper does not comprehensively quantify the financial trade-offs between reshoring and offshoring, which could provide further insights into the feasibility of long-term reshoring strategies.

Managerial implications. *This study highlights key strategies for luxury fashion brands considering reshoring their production. First, managers should recognize that reshoring offers an opportunity to strengthen brand heritage and improve the perception of craftsmanship, quality and sustainability. By returning production to Italy, brands can reinforce the "Made in Italy" label, which is synonymous with luxury, high-quality craftsmanship and ethical standards. This can enhance consumer loyalty and appeal to environmentally conscious Gen Z consumers who are willing to pay a premium for sustainably produced goods.*

Furthermore, managers should invest in technologies like blockchain to improve transparency and traceability in their supply chains. Digital tools are increasingly important for gaining consumer trust and enhancing brand authenticity, particularly in the face of growing demand for ethical and transparent business practices.

Additionally, reshoring allows for greater control over supply chain disruptions, which have been exacerbated by global events like the COVID-19 pandemic and geopolitical tensions. Managers should leverage reshoring to improve operational efficiency and mitigate risks associated with international sourcing.

However, challenges such as labor shortages and the high cost of specialized artisans in Italy should be carefully managed. Brands must invest in workforce development and offer competitive wages to attract and retain skilled labor.

Originality of the paper. *The originality of this study lies in its integrated and multidimensional approach to exploring the reshoring phenomenon in Italy's luxury fashion sector, with a specific focus on the concept of "Made in Italy" and the impact of COO on consumer decision-making. While numerous studies have addressed reshoring in a general context, few have specifically examined its role in the luxury fashion industry and the influence of the "Made in Italy" label in reshoring decisions.*

Accordingly, it provides a unique perspective by linking reshoring with sustainability, ethical consumption and digital transparency, key drivers in today's global business environment. It moves beyond traditional economic motivations such as cost reduction or supply chain efficiency, incorporating consumer behavior trends, especially the rising demand for eco-friendly products and responsible manufacturing practices. By examining the relationship between COO perceptions and reshoring in the context of luxury fashion, the work introduces new insights into how "Made in Italy" acts not only

as a symbol of craftsmanship and quality but also as a significant driver for reshoring strategies, aligning with consumer preferences for sustainability and transparency.

Furthermore, the study highlights the role of digital tools like blockchain in reshoring decisions, providing transparency and traceability in supply chains. This technological component adds a contemporary dimension to the study, reflecting the industry's move towards greater accountability and consumer trust. The research also considers the broader implications of reshoring beyond economic factors, such as the preservation of artisanal skills, the protection of brand heritage, and the impact of regulatory frameworks like the EU Circular Economy Action Plan.

By focusing on a timely topic, the paper contributes to the existing literature by offering a deeper understanding of the reshoring process within the luxury fashion sector, specifically in Italy. It offers valuable insights for managers looking to strategically align their operations with consumer demands for ethical, transparent and sustainable production practices, while preserving the prestigious "Made in Italy" identity. This paper thus adds significant originality by combining industry trends, consumer insights and technological advancements in reshoring decision-making.

Keywords: *Reshoring; fashion; made in; Italy.*

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Institutional perspectives on internationalization choices of state-owned enterprises

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Abstract

State-owned enterprises (SOEs) play a key role in global economics, navigating challenging ground between governmental directives and market forces. In contrast to privately-owned enterprises focused more on profit maximization, SOEs often balance broader socio-economic objectives, positioning them uniquely in international business strategy discussions. The internationalization strategies of SOEs are particularly influenced by their home countries' political and economic frameworks, which shape their choices between greenfield investments and mergers and acquisitions (M&As). This decision-making process is crucial as it reflects both the strategic priorities and the operational constraints imposed by state ownership. The general problem addressed in this study is the unclear influence of state ownership and home country institutional frameworks on SOEs' choices of establishment mode in foreign markets. Here, we show, using a dataset from 2000 to 2023 and various global markets, that state ownership biases SOEs towards selecting greenfield investments over M&As when expanding internationally. This result challenges the prevailing assumption that SOEs primarily prefer M&As to quickly establish a presence in new markets and leverage existing structures. Our findings indicate that the institutional context of the home country, specifically whether it aligns with Liberal Market Economies or Coordinated Market Economies, plays an important role in shaping these preferences. This insight modifies our understanding of how different governance structures impact SOE behavior. The results of this study show the importance of considering institutional and political contexts when analyzing the strategic decisions of SOEs, which not only pursue economic returns but also fulfill governmental mandates. These results aid policymakers and corporate strategists in designing frameworks that accommodate both economic and socio-political objectives, ensuring that SOEs' international ventures support broader national interests. In a general context, this research enriches the discourse on global economic strategies by illustrating how state-driven entities adapt to and shape international market dynamics, reflecting broader geopolitical and economic trends. These findings contribute to a global economic narrative, highlighting the strategic dimensions of state ownership in international business.

Framing of the research. *In the last decades, the global scenario has become increasingly complicated, especially for firms that are facing multiple interests and objectives. While private-owned enterprises (POEs) usually try to reach the so-called "profit-maximization" goal, other companies must combine it with different objectives, such as security, long-term survival, or supply of resources. Crucial actors following these concepts are SOEs. These corporate entities are particular companies in which the state exerts some kind of ownership. Due to this ownership (and control), SOEs are able to combine different views, needs and interests. This reflects the vast political and institutional actors that can influence SOEs' activities (Tihanyi et al., 2019). SOEs started their internationalization process worldwide to pursue strategic objectives and business opportunities. From the 2000s, the number of SOEs that became multinational has dramatically increased, showing a vast number of foreign direct investments (FDIs) in both developed and emerging economies (OECD, 2023). Due to their crucial role in the home country's economic development, several SOEs started to be recognized as "national champions" (Hennart, 2017).*

SOEs have long operated at the intersection of politics and economics, adapting to evolving institutional landscapes across different regions. Their role and influence have shifted over time, shaped by historical events, market liberalization, and government policies. In the decades following World War II, SOEs proliferated in developed economies, expanding their international reach and contributing to national economic strategies (Bruton et al., 2015). In contrast, emerging markets only began to assert their presence in the global economy over the past two decades as governments increasingly leveraged SOEs to drive international expansion and enhance their competitiveness on the world stage (Cuervo-Cazurra et al., 2023). This transformation has positioned SOEs as key players in global markets, often acting as extensions of state interests beyond their domestic borders.

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Unlike private firms, SOEs operate with a dual mandate: they are expected to generate economic value while simultaneously serving broader national objectives. Governments often rely on them to ensure energy security, control strategic industries, and foster technological innovation (Bass & Chakrabarty, 2014). In times of geopolitical uncertainty, SOEs become even more critical as instruments of state policy. The study of SOEs within international business (IB) research has traced their evolution across diverse political and economic systems, examining the institutional, regulatory, and governance factors that shape their behavior (Cuervo-Cazurra, 2018). While some scholars emphasize the advantages SOEs gain from state backing - such as preferential financing and policy support - others highlight the constraints they face, including regulatory scrutiny and political interference. As globalization intensifies and geopolitical tensions reshape trade relationships, SOEs remain at the center of debates on economic sovereignty, market efficiency, and state intervention (Mariotti & Marzano, 2019). Their role is relevant to policymakers and institutions, private firms, and investors seeking to understand the broader forces shaping global business dynamics.

Previous literature posed attention to different types and dynamics of SOEs' internationalization, focusing on different theories such as agency theory, resource-based view, resource dependence theory, and institutional theory (Benito et al., 2016). The latter, especially, was extensively used to incorporate a wide range of perspectives stemming from different institutions. Every kind of institutional actor influences SOEs' choices and, especially, all the decisions concerning activities outside the border of the country. Indeed, home country characteristics play a crucial role in shaping SOEs' behavior (Cuervo-Cazurra & Li, 2021). The quality of home institutions, political factors, and laws contribute to the internationalization efforts of SOEs, facilitating FDIs and cross-border deals (Chen et al., 2019).

One of the core concepts in the literature of international relations and IB is the "Varieties of Capitalism" (VoC) framework (Hall & Soskice, 2001). VoC provides a comparative institutional perspective on national economies, distinguishing between Liberal Market Economies (LMEs) and Coordinated Market Economies (CMEs). This approach emphasizes the institutional complementarities that shape firm behavior, economic performance, and competitive advantage across different capitalist systems. Within this framework, LMEs - such as the United States and the United Kingdom - rely on market-based coordination, competitive labor markets, and financial systems prioritizing short-term shareholder value. In contrast, CMEs - such as Germany and Sweden - depend on non-market coordination, long-term relationships with stakeholders, and bank-based financial systems that support strategic investments (Jackson & Deeg, 2008).

The VoC perspective has significant implications for international business research, particularly in explaining the internationalization strategies of firms. The institutional arrangements in LMEs and CMEs influence corporate governance structures, labor relations, and innovation patterns, which in turn shape firms' approaches to foreign market entry and global expansion. For instance, firms from LMEs often pursue internationalization strategies characterized by cross-border mergers and acquisitions (M&As) and market-driven expansion, as these align with their emphasis on flexibility and shareholder value maximization. Conversely, firms from CMEs tend to favor international joint ventures and strategic alliances, leveraging their coordinated networks and long-term relational commitments to mitigate risks and ensure sustainable growth (Mariotti & Marzano, 2019).

Moreover, the VoC framework sheds light on how multinational enterprises adapt their strategies to host-country institutional environments. When expanding into markets with institutional configurations different from their home country, firms may encounter institutional voids, regulatory constraints, or differing labor market dynamics that require strategic adaptation (Inoue et al., 2013). For example, an LME-based firm entering a CME-based market may need to adjust its managerial practices to accommodate collective bargaining agreements and long-term employment relationships, while a CME-based firm expanding into an LME-based environment might face pressures to prioritize short-term financial performance over stakeholder-oriented strategies. Overall, the VoC framework offers a robust analytical lens for understanding the diversity of capitalist systems and their impact on international business strategies. By integrating institutional diversity into IB research, previous literature partially explained variations in firm behavior, level of internationalization and global competitiveness (Mariotti & Marzano, 2020).

Although previous research has incorporated the concept of VoC in IB research, one of the key topics was neglected: the entry and establishment mode choice. Entry modes refer to firms' strategic choices when expanding into foreign markets, determining the structure and degree of control they maintain over international operations (Hennart, 2009). The selection of an appropriate entry mode is influenced by factors such as firm-specific advantages, industry conditions, institutional environments, and risk considerations. Establishment modes refer to how firms set up their operations in a foreign market, typically focusing on investment-based entry strategies. They are a subset of entry modes that emphasize the degree of ownership and control a firm maintains over its foreign subsidiary. The two primary establishment modes are greenfield investments and M&As. The establishment mode choice is a crucial topic in IB research and can be influenced by multiple factors. The influence of different types of capitalism and institutional factors, such as democracy and inter-country relations, was neglected, remaining unclear in current literature.

Purpose of the paper. *This paper aims to investigate the impact of state ownership on firms' establishment mode choices in foreign markets, specifically examining the choice between greenfield investments and M&As. SOEs operate under distinct strategic and institutional constraints compared to POEs, influencing their risk preferences, resource allocations, and long-term objectives in international expansion (Estrin et al., 2016). While prior research has explored the role of ownership structure in IB decisions, limited attention has been given to how state ownership shapes entry and establishment mode selection in cross-border investments (Grøgaard et al., 2019). This study seeks to bridge this gap by quantitatively analyzing the relationship between state ownership and establishment mode choice.*

Beyond the direct effects of state ownership, this paper further examines how institutional contexts moderate this relationship. Specifically, we draw on the VoC framework to explore how home-country institutional environments influence the strategic behavior of state-owned firms (Grosman et al., 2016). Firms originating from CMEs and LMEs operate under different governance structures, financial systems, and labor relations, which may shape their internationalization strategies differently. By integrating the VoC perspective, we aim to provide a nuanced understanding of how national economic systems condition the effects of state ownership on establishment mode decisions (Liang et al., 2015).

Additionally, this study investigates the moderating role of democracy and inter-country relations in shaping SOEs' internationalization strategies. The level of democracy in a firm's home country can influence the extent to which political actors interfere in corporate decision-making, affecting risk tolerance, investment preferences, and strategic autonomy. In more democratic environments, SOEs may experience greater transparency and regulatory oversight, potentially altering their approach to foreign expansion. Conversely, in less democratic settings, state influence may be more pronounced, leading to different investment behaviors abroad. By examining the interplay between state ownership, VoC, democracy and inter-country relations, this paper contributes to a more comprehensive understanding of how institutional factors shape establishment mode choices in IB research. Therefore, we theorized a preliminary set of hypotheses:

H1: Ceteris paribus, SOEs are more likely to choose greenfield investments over M&As compared to POEs
H2: In CMEs SOEs show a higher propensity to greenfield investments over M&As compared to POEs
H3: In LMEs SOEs show a lower propensity to greenfield investments over M&As compared to POEs
H4: As the level of democracy in the home country increases, SOEs demonstrate a greater tendency to choose greenfield investments over M&As compared to POEs
H5: Stronger inter-country relations between the home and host country increase the likelihood that SOEs will prefer greenfield investments over M&As compared to POEs

Methodology. *We use a dataset containing information on state-owned enterprises (SOEs) and privately-owned enterprises (POEs) that have engaged in foreign market entries from 2000 to 2023. The data is sourced from reputable international databases[4] such as the Bureau Van Dijk, OECD and World Bank, capturing details on entry modes (greenfield investments versus mergers and acquisitions), degrees of state ownership, and other firm-specific attributes like industry classification, size, and age. Additionally, we integrate economic and political indicators from both home and host countries to enrich our analysis.*

To ensure a balanced and comparable dataset, we adopt a refined three-step process for sample construction. Initially, we create a control group of POEs that did not undertake international expansions during the same period, ensuring comparability in terms of size, industry, and economic conditions of the home country. Next, we exclude any firms that received similar state interventions or engaged in comparable entry modes in different markets to eliminate potential confounding effects. To this end as third step of data sampling, in line with (Guerzoni & Raiteri, 2015; Guo et al., 2016; Shipman et al., 2017; Caragliu & Del Bo, 2019) to ensure that the control sample and the treated sample are as consistent as possible, we consider a Propensity Score Matching (PSM) using a 1:n ratio, matching each SOE with multiple POEs based on a broad set of characteristics, including industry, size, and economic health, to have robust comparability.

After matching, we use logistic regression to assess the impact of state ownership on the choice of entry mode. The logistic regression model is specified as follows.

$$\text{Logit}\big(P(Y_i = 1)\big) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_n X_{ni} + \epsilon_i$$

Where Y_i is the choice of entry mode (1 for greenfield investments, 0 for mergers and acquisitions), X_{1i} X_{2i} X_{ni} represent the independent variables including state ownership, industry characteristics, and institutional factors, and ϵ_i is the error term. This model allows us to control for various influences on the decision-making process regarding entry modes.

Moreover, we explore the moderating effects of home-country institutions using the Varieties of Capitalism framework, as well as other political factors such as democracy levels and international relations, to understand how they influence the relationship between state ownership and entry mode choice.

To validate the quality of our matching and the effectiveness of our sample, we first perform a series of tests to evaluate the balance of characteristics between matched groups. We calculate the Standardized Mean Differences (SMD) for all variables pre and post-matching and conduct t-tests to compare the means of these groups to verify there are no significant differences prior to treatment. Using a caliper width, we limit the maximum allowable distance between the

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[4] *Economist Intelligence Unit. Democracy index: https://ourworldindata.org/grapher/democracy-index-eiu?time=latest*
GDELT Project: https://www.gdeltproject.org/
Global Change Data Lab. Democracy index: https://ourworldindata.org/explorers/democracy?country=ARG~AUS~BWA~CHN~OWID_WRL&Dataset=Varieties+of+Democracy&Metric=Electoral+democracy&Sub-metric=Main+index
OECD (2023). OECD Forum Network: https://www.oecd-forum.org/posts/an-increasing-role-of-state-owned-enterprises-in-the-global-economy-calls-for-better-governance.

propensity scores of matched firms, employing nearest-neighbor matching without replacement. This process ensures that the sample mirrors the distribution of characteristics within the treatment group, enhancing the credibility of our causal inferences.

Results. *The expected results of this study would aim to better understand how state ownership influences decisions on how firms enter the international business, focusing on the choice between greenfield investment and mergers and acquisitions. Based on the theoretical framework and empirical strategy outlined, state-owned enterprises (SOEs) are expected to demonstrate a greater propensity for greenfield investment than private enterprises (POEs). This trend can be attributed to the strategic and institutional imperatives that drive SOEs, including the pursuit of long-term national goals and the influence of home country governance structures. In addition, the research expects that the impact of state ownership on entry decisions is moderated by the type of capitalism practiced in the home country. Specifically, SOEs from coordinated market economies (CMEs) are expected to show a greater preference for greenfield investment because of their institutional environment that favors strategic, long-term investment over short-term gains. In contrast, SOEs in liberal market economies (LMEs) may show a lower propensity for greenfield investment, potentially favoring mergers and acquisitions that align with flexible, market-oriented business strategies.*

In addition to the baseline model, this study could reveal how levels of democracy and international relations between home and host countries influence SOEs' strategic choices. It is likely that higher levels of democracy in the home country correlate with greater transparency and accountability of SOEs, which could lead to a preference for greenfield investments that require substantial long-term commitments and are less susceptible to political fluctuations. Similarly, strong country relationships are expected to facilitate greenfield investment by reducing the political and economic risks associated with foreign direct investment.

Research limitations. *Although this study attempts to provide an analysis of the choices of how SOEs are established, several limitations must be acknowledged. First, the use of data from secondary sources may introduce biases related to the accuracy of data reported by different countries and firms. Despite efforts to ensure data quality through reliable sources, some level of inconsistency and error is inevitable.*

Another limitation concerns the generalizability of the results. The fact that the study focuses on state-owned versus privately owned enterprises, primarily in specific types of market economies (LMEs and CMEs), may limit the applicability of the results to other contexts, such as transition or developing economies, where state ownership and institutional frameworks differ significantly. In addition, the propensity score matching method, while effective in controlling for observable confounding variables, cannot account for unobserved heterogeneity that might influence establishment mode choices.

In addition, the study's methodology, which focuses on quantitative analysis, may overlook qualitative factors such as cultural influences, managerial decision-making processes, and informal institutional pressures that could have a significant impact on SOE strategic choices. These elements often require more granular, case-by-case investigation beyond the scope of the current study.

Despite these limitations, the research provides valuable insights into the strategic behaviors of SOEs in the international landscape, contributing to theoretical and empirical discussions in the field of international business.

Managerial implications. *The findings of this study have potential implications for both managers and policymakers involved in international investments regulation. For managers, understanding the influence of state ownership on establishment mode choices can help in making strategic decisions that align with both firm objectives and institutional constraints. SOEs should consider the institutional environment of both home and host countries when selecting between greenfield investments and M&As, ensuring that their strategies align with long-term goals and risk management considerations. In particular, SOEs from CMEs may benefit from leveraging existing networks and long-term investment strategies when entering foreign markets. At the same time, those from LMEs may need to adopt more flexible approaches to account for different market dynamics.*

From a policy perspective, governments and international regulatory bodies should recognize the unique challenges and advantages of state ownership in cross-border investments. Policymakers in home countries should establish frameworks that provide SOEs with strategic autonomy while ensuring transparency and accountability in their international activities. Similarly, host-country regulators need to consider the institutional origins of SOEs when formulating policies on FDIs, balancing economic benefits with potential concerns about state influence. Furthermore, policies promoting strong inter-country relations can facilitate more predictable and mutually beneficial investment decisions by SOEs, fostering stable international environments.

By addressing these managerial and policy considerations, this study contributes to a better understanding of how institutional contexts shape the internationalization strategies of SOEs, offering actionable insights for practitioners and regulators alike. Future research can further explore how evolving institutional configurations, such as hybrid market economies or changes in global governance, affect firm internationalization and cross-border collaboration. Moreover, different types of VoC and democracies can be used to understand if specific institutional environments facilitate or constrain global investments, particularly regarding entry and establishment mode choice.

Originality of the paper. *This paper contributes significantly to the IB literature by offering a novel perspective on the establishment mode choices of SOEs. While prior studies have examined entry modes under multiple conditions, limited research has explicitly investigated the role of state ownership in shaping firms' preferences for greenfield investments versus M&A. By focusing on SOEs, this study extends the traditional understanding of entry mode strategies, incorporating the unique constraints and opportunities that state ownership brings to international expansion decisions.*

One key originality of this study lies in its conceptual approach, which integrates the VoC framework and political institutional factors (democracy) into the analysis of SOEs' internationalization. Existing research on establishment mode choices has predominantly focused on firm-level characteristics or industry conditions. However, this study emphasizes the role of home country institutional structures in shaping SOE behavior, providing a more comprehensive view of how institutional environments influence foreign investment decisions. By distinguishing CMEs and LMEs, this paper highlights how different economic systems impact SOEs' risk preferences and strategic choices.

Furthermore, by incorporating democracy and inter-country relations as moderating factors, this paper sheds light on the political dimensions of SOEs' decision-making, recognizing that governance structures can significantly influence firms' internationalization behavior.

Methodologically, this study also contributes by employing a robust empirical strategy that integrates multiple institutional and political indicators. By analyzing a cross-national dataset of SOEs and POEs, this research provides empirical insights that enhance the generalizability of its findings. Moreover, including inter-country relations as a moderating factor expands the scope of international business research by addressing the geopolitical considerations that may shape SOEs' investment decisions.

Overall, this paper contributes original insights by bridging gaps in the literature on state ownership, institutional theory, and establishment mode choices. By integrating economic systems, political governance, and international relations into the analysis, this study advances theoretical and empirical understandings of how SOEs create foreign investment decisions, with implications for both managers and policy-makers.

Key words: *Entry modes; Establishment modes; State ownership; International Business; Institutions; Varieties of Capitalism.*

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“Made in Japan” vs “Made in Germany”: An Application of the Implicit Association Test to the Study of the Country-of-Origin Effect

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Abstract

Research on the Country-of-OriginEffect (COO-effect) reveals that the place of origin of a given product can affect consumers’ purchase choices positively or negatively, depending on the positive or negative beliefs consumers associate with that place. Certain products are perceived as better than others because they enjoy the positive association with a particular country, and marketers can benefit from emphasizing and promoting information about the country of origin when it enjoys positive stereotypes by extolling the geographical origin of the product, for example, through packaging and communication tools. A positive country-of-origin reputation amplifies the product’s perceived value, favoring its purchase by consumers. To the best of our knowledge, studies regarding this psychological effect have always been conducted on an explicit level through traditional research tools, such as questionnaires, which measure cognitive and affective constructs consciously held and stated by respondents. The problem for marketers is that people do not always want (or are able) to say what they think; even if they do, their behaviors are not always consistent with what they say. As a result, the results of market surveys conducted with traditional tools such as questionnaires may not always be reliable and may be characterized by reduced predictive ability. To better predict purchasing behavior, it is also necessary to analyze implicit constructs of which people are unaware, which, together with explicit cognitions (consciously accessed), guide their purchasing behavior. In our research, we apply to the study of COO-effect a test for measuring implicit constructs within a lab experiment involving 50 participants. Specifically, we investigated the degree of innovativeness perceived by Italian consumers concerning “Made in Germany” products, on the one hand, and “Made in Japan” products, on the other, both at the explicit level (through a questionnaire) and at the implicit level (through participation in a Implicit Association Test). This dual approach makes our research original; to the best of our knowledge, this is the first time that the COO-effect has also been analyzed on the implicit level, and our lab experiment was designed and implemented precisely to provide an initial answer to this methodological gap. The research confirms our initial working hypothesis that Italian consumers are inclined to relate the dimension of innovativeness more strongly to the COO label “Made in Japan” (vs the label “Made in Germany”). From comparing the results that emerged via Questionnaire and IAT, we found that on the implicit level there was not as marked a difference in perceived innovativeness as that which emerged on the explicit level, and that 52% of the participants manifested inconsistency between what they stated explicitly in the Questionnaire and what emerged on the implicit level via the IAT. Some managerial implications and limitations of our study are finally discussed.

Framing of the research. *Many studies have shown that the place of origin of a given product can affect consumers’ purchase choices positively (or negatively), depending on the positive (or negative) beliefs consumers associate with that place. Schooler’s (1965) pioneering study showed that the country of origin of products produced effects on consumer behavior: the sample of participants, consisting of Guatemalan students, all other things being equal, rated products whose labels referred to Guatemala and Mexico as being of higher quality while providing a negative rating for products from Costa Rica and El Salvador. Reierson (1966) also conducted research on COO-effect, involving a sample consisting of U.S. students whom he asked to express an opinion about certain goods from not only the U.S. but also from other countries such as Japan, Germany, Italy, France, UK, Sweden, Denmark, Belgium and Canada. That study showed a clear preference toward domestic products; however, research conducted by the same author the following year (Reierson, 1967) pointed out that such stereotypes could be changed with an appropriate*

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marketing campaign. Gaedeke (1973) highlighted the fact that products made in USA were often preferred to goods manufactured in countries with less advanced economies; similarly, Schott et al. (2022) studied a sample of U.S. consumers with respect to the origin of chocolate bars (U.S. and Europe on one side, South America and Africa on the other), perceiving greater quality and taste in the case of bars produced in more developed countries. It would seem, then, that a country's level of development can have an important impact on consumer perceptions. Also of interest is the study by De Nisco & Oduro (2022), who, in a literature review, confirmed how COO influences consumer behavior: in particular, the Country of the Brand is the component of COO that seems to have the most significant impact on purchase intentions. Some studies have recently focused on the influence of COO on food consumption (Wang & Park, 2025; Flores Kuff et al., 2023; Dobrenova et al., 2015). Specifically, Wang and Park (2025) tested the impact of the origin of insects for food use (Japan vs China) by observing that Japanese people tend to prefer local insects; similarly, Flores Kuff et al. (2023) showed that cricket meal is perceived to be higher in quality when sourced from countries with positive reputations.

However, according to Nagashima (1970), people's attitudes toward products from a specific nation are not static over time. In this sense, "Made in" can be understood as the vehicle of cognitions and attitudes that consumers associate with a specific country at a particular historical moment. As pointed out by Vianelli & Marzano (2012), the limitations of the first strand of COO-effect studies were mainly due to the fact that they were research based on a single-cue methodology, that is, they investigated the effects of the country of origin of the product on consumers' choices without, however, considering the presence of other variables that could influence their behavior. This approach led to an overestimation of the phenomenon, "nation of origin" being the only variable on which respondents based their evaluations.

The second strand of studies, since the early 1980s, highlighted that the more variables considered, the smaller the effect exerted by the product's country of origin. The first significant survey in this direction was conducted by Johansson et al. (1985), who, through a multi-cue approach, investigated consumer perceptions of cars produced in Japan, Germany and the USA. As many as 13 attributes were associated with the automobile product that the respondents evaluated. The study's results were significant because they highlighted that country-of-origin effects on consumer attitudes were less significant than had been found in research to that point. Peterson & Jolibert (1995), through a meta-analysis concerning 52 COO-effect studies, quantified the differences between the single-cue and multi-cue approaches. In single-cue studies, the average COO-effect affects 30 percent, while in multi-cue surveys this effect drops to 16 percent. With reference to "purchase intentions", the effect of country of origin even decreases from 19% to 3%. Usunier (2002) highlighted the causes why COO has a less significant impact on the consumer buying process than what had emerged from early studies conducted on the phenomenon since the 1960s. Three main causes emerged from that study:

1) *For consumers to be influenced in their purchasing process, it is necessary for them to consider information about the product's origin relevant to their choice. This varies according to the product category considered;*
2) *The consumer must attach such importance to the product's origin that he/she invests time and energy in researching and comparing alternative origins;*
3) *For certain types of goods, the purchase of which does not involve high psychological involvement, information about the country of origin assumes less importance than other attributes such as price, brand, and warranty.*

Vianelli & Marzano (2012) point out that this strand of research makes an important contribution to the study of the COO-effect, since, on the one hand, it scales down its magnitude and, on the other hand, it offers a systemic analysis of the phenomenon, which is broken down into its various components and related to the multiple variables related to the product, the consumer and the economic environment of reference.

More recently, some reviews have shed light on the development of the topic in terms of research (Yadav et al., 2024; Samiee et al., 2024). Specifically, Yadav et al. (2024) systematically reviewed 590 papers published during the last 30 years, highlighting that the COO-effect may be relevant also with regard to international segmentation and positioning strategies. By the way, Cristea et al. (2015) studied the way it affects brand positioning, revealing that it can act on reduction of perceived risks and trigger positive attitudes towards the buying decision process. Pagan et al. (2025), in addition, focused on the role of ethnocentrism and animosity in the case of wine consumers in Brazil. By involving 154 young consumers, they found that COO influences the intention to buy wine and ethnocentrism; while it affects perceived quality, it seems does not impact purchase decisions, which is also negatively associated with animosity. As for these components, De Nisco et al. (2016) analyzed consumer ethnocentrism and economic animosity regarding the image of Germany by a sample of Italian and Spanish graduated students. Their findings indicate that economic animosity towards a country does not affect the perceived image of that country or the expected quality of products made there. At the same time, it influences receptivity, so there is an inclination to be hostile towards products imported from that country.

In addition, the impact of COO can be extended to B2B markets too. As a matter of fact, Crespo et al. (2025) studied the impact of supplier-country image on customers, observing that country image influences relationship quality dimensions and perceived product quality. Country Image is another relevant component of COO (Leonidou et al., 2022), and Charinsarn & Speece (2025) affirm that it is increasingly connected to environmental issues. By the way, stereotypes can contribute to developing the image of a country (Bertoli & Valdani, 2023), as also shown by Feng et al. (2022), whose study highlights how they impact tourists' intention to visit a country.

In its initial connotation, the expression "country of origin" implicitly assumed that design and production took place in a single nation. In today's environment, permeated by globalization, many companies operating on an international scale tend to relocate several activities that make up the value chain in order to gain reputational advantages and/or lower production costs, depending on where these activities are located. As a result, consumers come into contact with "hybrid" products for which the country in which the product is designed, assembled, manufactured and from which raw materials are sourced may not coincide. Vianelli & Marzano (2012) point out that there is no agreement among researchers as to which of the aforementioned components has the greatest impact on consumers' perceptions of product quality. Today, it is not only the country where the good is actually produced that matters. For some scholars, consumers place more importance on the country of design where R&D is carried out (Li et al., 2000). In contrast, research conducted by Quester et al. (2000) points out that the most relevant component of COO in terms of perceived quality is the country from which a product's raw materials originate (Country of Parts). According to a study conducted by Hamzaoui (2010), the country of origin of production (Country of Manufacture) is more important to consumers, regardless of whether the products are simple or technologically complex. Earlier research carried out by Insch & McBride (1998) showed that for companies from countries with a low reputation, it might be useful to move assembly activities (Country of Assembly) to another country with a "superior" image, overshadowing information about the actual place of production. Vianelli & Marzano (2012) point out that the latest studies on the subject identify the brand's country of origin (Country of Brand) as the component that most impact consumer perceptions. In essence, the place where the product was designed, manufactured or assembled turns out to be less important than the place where the brand was born. Thus, mental associations between the product's brand and the country in which it is historically rooted would matter most in the purchasing process.

Purpose of the paper. *This research investigates the relationship between COO and the perceived degree of innovativeness among a sample of young Italians. Our study compared the labels "Made in Germany" and "Made in Japan". The choice of these COOs was not random. Japan and Germany occupy the top two places in the Nation Brand Index ranking (Anholt-Ipsos, 2023) and they enjoy the best overall reputation globally. Japan is currently perceived as the most innovative country globally, but the difference with Germany is not stark; in fact, the German country is perceived to be among the top 5 most innovative countries worldwide. In addition, the European Patent Office highlights that Germany is the European country where the most patent applications are filed (European Patent Office, 2023). Specifically, we investigated the degree of innovativeness that such COO labels evoke, both on an explicit level through the administration of a Questionnaire and on an implicit level through participation in an Implicit Association Test (IAT) (defined by Gregg & Klymowsky, 2013, as a valuable tool for market research). This dual measurement stems from the need to obtain information that is generally not accessible through traditional research tools such as questionnaires. Indeed, people are not always able (or willing) to say what they think; even if they do, their behaviors are not always consistent with what they say. The phenomena just mentioned may reflect difficulties of introspection on the part of those involved and/or biases potentially resulting from respondents' desire to provide a certain (socially desirable) self-image (Zogmaister & Castelli, 2006; Greenwald & Banaji, 1995). For these reasons, survey results may be unreliable, characterized by incompleteness and reduced predictive ability of potential customers' responses. To better predict buying behavior it is also necessary to analyze the beliefs and stereotypes of which people are, at times, unconscious bearers. The instrument we used to conduct the measurement on the implicit plane is the Implicit Association Test (IAT; Greenwald et al., 1998). The choice is related to the high internal consistency values and other relevant psychometric features of this test relative to other implicit measures (Lane et al., 2007; Teige-Mocigemba et al., 2010). The IAT differs from "traditional" survey instruments such as interviews, questionnaires, and focus groups in that it does not require people to state their opinions explicitly but by measuring the response times associated with stimulus-item classification tasks into special pre-assigned categories and the accuracy of the answers given by participants, it is possible to trace the cognitive and affective constructs they unconsciously hold. Indeed, people carry "(...) implicit cognitions, which do not replace, but rather complement the opinions and ideas that [they] hold explicitly and consciously. In many cases, implicit and explicit cognitions concur in influencing behavior, yet frequently they affect different aspects of conduct: therefore, it is particularly interesting to study both of these levels" (Zogmaister & Castelli, 2006, p. 66).*

Methodology. *Our approach involved a comparison between a plane of constructs implicitly settled in participants' minds and a plane explicitly held and communicated by the subjects. To the best of our knowledge, while many contributions on COO-effect are available in the literature, none of them has been concerned with flanking analyses conducted on the explicit plane (typically through surveys) with investigations aimed at illuminating the plane of constructs implicitly held by individuals regarding product source claims. Our lab experiment, designed and implemented precisely to provide an initial response to the mentioned methodological gap, was structured in two phases. The first phase involved a questionnaire measurement of the explicit association between two different countries of origin of products ("Made in Japan" and "Made in Germany") and the degree of innovativeness perceived by the participants. In the second phase of our study, however, we administered an IAT to measure the implicit association between COO and the degree of innovativeness perceived by the subjects.*

The measurement of the explicit association between the two COOs being compared and the categories "Innovation", on the one hand, and "Tradition", on the other, was done by asking the participants to express their ratings on a bipolar adjective Osgood rating scale with reference to two explicit questions. Specifically, participants

were asked to express numerical ratings on a seven-grade scale: in which 7 indicates the pole expressed by the adjective "innovative", while 1 indicates the pole expressed by the adjective "traditional". Participants were asked to express themselves generically concerning "Made in Germany" and "Made in Japan" products without thinking of specific product categories or individual brands. The responses provided by all participants in the "explicit measurement" phase of the experiment populated a database and were subsequently subjected to the calculation of descriptive statistics. Finally, with reference to these data, a dependent-samples t-test was conducted to assess whether the differences in the mean values of the ratings between the two "innovation-tradition" poles recorded with reference to the two COOs were statistically significant. Regarding the explicit-type analysis plan, consistent also with the findings of the latest Anholt-Ipsos Report (Anholt-Ipsos, 2023), we expect to detect a higher degree of perceived innovativeness in the COO label "Made in Japan" than in the "Made in Germany" label.

The second part of our experiment involved a further measurement, this time on the implicit level, of the strength of the associative links between COO and innovativeness in the minds of participants. For this purpose, we resorted to an IAT, which we programmed and administered using the software "Inquisit 3.0.2.0" (Millisecond Software LLC, Seattle, WA). The IAT is a test designed to surface automatic, spontaneous (and often unconscious) cognitions among concepts that interest a researcher (Zogmaister & Castelli, 2006). The IAT, in effect, is able to capture the intensity of the association between two target categories (in our case "Made in Japan" vs "Made in Germany") and two attribute categories (in our experiment represented by "Innovation" vs "Tradition"). This Test is developed in a series of steps (five or seven, as in our case), some of which are merely preparatory in nature. The IAT involves a succession of tasks of classifying items (words, pictures or sounds) into their respective categories. Two categories, so-called "target," are taken into account (e.g., "Made in Germany" and "Made in Japan") and typically exemplified by words or images that can be attributed to them (see Figure 1). Two additional categories, called "attribute," arranged along a bipolar dimension (in our case "Innovation" vs "Tradition"), are introduced into the analysis and equally exemplified through words or images (see Table 1).

Fig. 1: Items representative of the target categories "Made in Germany" and "Made in Japan"

Source(s): All pictures are sourced from publicly available sources.

Tab. 1: Adjective-items representative of the two attribute categories

Attribute categories	*Adjective-items*
Innovation	*(a) innovative; (b) new; (c) pioneering; (d) innovator; (e) cutting edge*
Tradition	*a) traditional; (b) historical; (c) conservative; (d) backward; (e) customary.*

Source: Authors' own work.

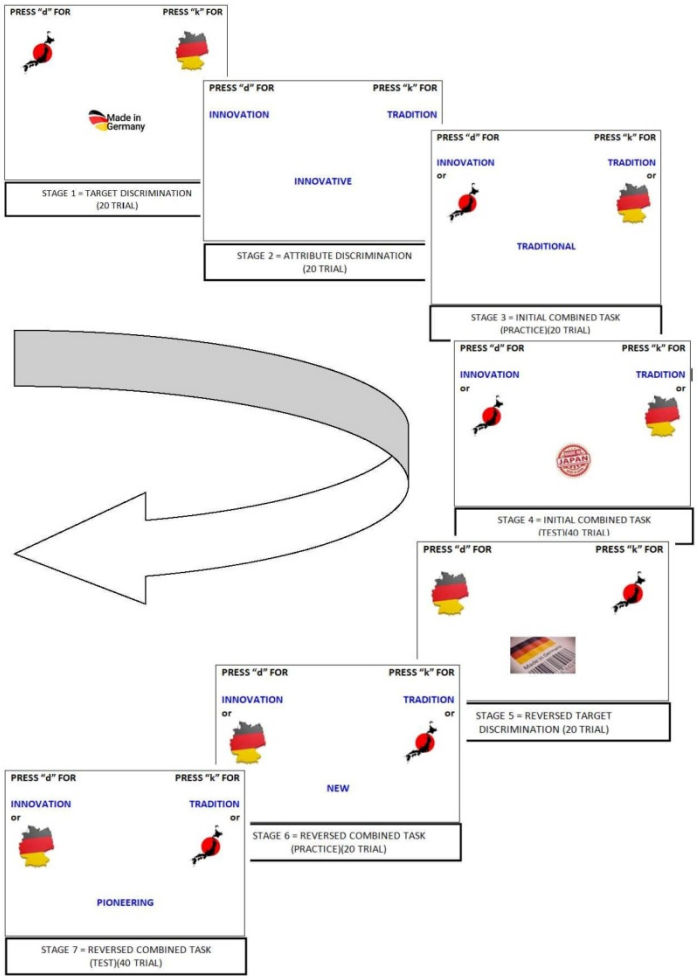
Each time a stimulus appeared on the monitor of a computer station, the participant was asked, in order to proceed further, to categorize it (as quickly and accurately as possible) using the "d" and "k" keys on the keyboard. The strength of the associative links between targets and attributes is assessed by comparing the response times recorded by the participant, particularly within the context of two combined categorization sessions between pairs of compared categories (see steps 4 and 7 in Table 2 and in the graphic exemplification of Figure 2).

Tab. 2: Sequence of phases of the IAT conducted in our study

			Assigned answer key	
Step	***Number of stimuli administered***	***Nature Task***	***Button "d"***	***Button "k"***
1	*20*	*target categorization*	*Made in Japan*	*Made in Germany*
2	*20*	*attribute categorization*	*Innovation*	*Tradition*
3	*20*	*combined categorization (practice)*	*Made in Japan/Innovation*	*Made in Germany/Tradition*
4	*40*	*combined categorization (test)*	*Made in Japan/Innovation*	*Made in Germany/Tradition*
5	*40*	*reverse target categorization*	*Made in Germany*	*Made in Japan*
6	*20*	*inverted combined categorization (practice)*	*Made in Germany/Innovation*	*Made in Japan/Tradition*
7	*40*	*inverted combined categorization (test)*	*Made in Germany/Innovation*	*Made in Japan/Tradition*

Source: Authors' own work.

Fig. 2: Synoptic overview of the phases of the IAT we conducted.



Source: Authors' own work.

The basic idea behind the IAT is that if two categories (one target and one attribute) are strongly associated in people's perceptions, then the response times recorded during the combined categorization steps are relatively faster (and the responses more accurate) when the two said categories share the same response key, compared to the case when two different keys are attached to them. The researcher's task is to measure and compare the response times and the percentage of correct responses recorded under the two combined categorization tasks to measure the so-called IAT-effect. However, the researcher, before performing the IAT, will have to hypothesize the existence of specific links between target categories and attributes. As a mere working hypothesis, by analogy to what was hypothesized with reference to the explicit analysis plan, we expect to record a strong association between "Made in Japan"/"Innovation", on the one hand, and "Made in Germany"/"Tradition", on the other hand (such a combination, in the scientific terminology of the IAT, is called a "compatible block."; the adjective "compatible" actually refers back

to "compatibility" concerning what the researcher hypothesized); while we expect the strength of the link to be weaker in the case of the "Made in Japan"/"Tradition" and "Made in Germany"/"Innovation" combination (so-called "incompatible block"; in this case the adjective "incompatible" refers back to inconsistency with respect to the hypothesis formulated by the researcher). If the researcher's hypothesis is true, the speed and accuracy of responses given about the "compatible block" will tend to be higher than what is recorded under the "incompatible block". Precisely by starting from the difference between the response times recorded in the "incompatible block" (step 7 of Table 2) and those recorded during the "compatible block" (step 4), it is possible to measure the IAT-effect, intended as a proxy for the intensity of the implicit association between the concepts examined. Positive values of the IAT-effect tend to support the associative robustness of the "compatible block" hypothesized by the researcher. At the sample level, then, it should be assessed, through appropriate statistical tests, whether the mean value of the IAT-effect (positive if the researcher's conjecture is valid) deviates significantly from a comparison value of zero (signalling value of total absence of performance differences within the two combined categorization tasks). Appropriate steps were taken during the administration of the stimulus-items to prevent any order-effects on the responses given.

Results. *Fifty adult subjects, including 25 women and 25 men, were admitted to our experiment. The sample size exceeds that necessary to ensure the statistical tests conducted (which are essentially based on t-student statistics), with $\alpha=0.05$, a test power of at least 80%, and to detect even a small effect size ($d=0.2$) (Clark-Carter, 2004). The participants, who reported to be in good health and to have normal (or corrected-to-normal) vision, collaborated in our research completely free of charge and voluntarily. All participants read and signed an informed consent form. The age of the participants was between 19 and 38 years (total mean age=27.5 years; SD=5.6).*

In the first part of the experiment, participants were asked to explicitly express the perceived degree of innovativeness in the two COOs compared on a seven-point Osgood scale. (where 1="traditional" and 7="innovative"). With reference to the COO label "Made in Germany," we recorded a mean score of 4.02(SD=1.27). Relative to the "Made in Japan" label, on the other hand, there was a mean Osgood scale value of 5.40(SD=1.47). To assess whether the differences between the two mean scores associated with the two COO labels differed to a statistically significant extent, we conducted a dependent samples t-test, which proved to be statistically significant [$t(49)=5.438$; $p<0.001$; Cohen's $d=0.769$].

With regard to the IAT, in accordance with our working hypothesis, the analyses showed lower mean response times (and higher accuracy rates) at the so-called "compatible" block (mean response time=916 ms and 96% accuracy), compared to what was found at the "incompatible" block (1015 ms and 94%). From the data just presented, a positive IAT-effect emerges (on average, 99 ms).

To understand whether the differences in mean response times and mean accuracy percentages recorded between the two blocks (compatible vs incompatible) were statistically significant and not simply related to chance, we conducted two t-tests for paired samples.

Specifically, the dependent-samples t-test on the average response times highlighted in the two blocks was found to be statistically significant [$t(49)=2.194$; $p<0.05$; Cohen's $d=0.311$], while the dependent-samples t-test conducted on the average percentages of response accuracy was not found to be statistically significant [$t(49)= 0.960$; n.s.].

At a more detailed level, analysis of the measurements conducted on the explicit level shows that as many as 38 individuals, corresponding to 76 percent of respondents, associate a higher degree of innovativeness with "Made in Japan" products than with "Made in Germany" products. German products are perceived to be more innovative than Japanese products by 10 individuals, corresponding to 20% of the respondents. In comparison, only 2 individuals (4% of the respondents) perceive the same degree of innovativeness for the two COO labels compared.

From the analysis of the measurements conducted on the implicit level, the gaps appear significantly less marked; in fact, only for 29 individuals (58% of the respondents) the association between "Made in Japan" and "Innovation" ("compatible block") was stronger, while for the remaining 21 participants (42% of the respondents) the association between "Made in Germany" and "Innovation" ("incompatible block") was stronger.

A joint analysis between the results that emerged based on what respondents stated in the Questionnaire and the results highlighted by the IAT shows that, not always, there is consistency between what people state on the explicit level and what emerges on the implicit level. Specifically, out of a sample of 50 individuals, consistency emerges between the explicit and implicit associations of 24 individuals (48 percent of the participants). Of these, 21 individuals declare "Made in Japan" to be more innovative on the explicit level, and the association between that COO label and the innovation attribute is also stronger on the unconscious level. The remaining 3 individuals consider "Made in Germany" more innovative on both the explicit and implicit levels. In essence, as many as 26 individuals, or 52% of the participants, expressed inconsistency between what they state explicitly and what emerges on the implicit level through the IAT. Of these, 17 individuals declared "Made in Japan" to be more innovative on the explicit level, but on the unconscious level, the "Made in Germany"-"Innovation" association appeared to be stronger. Another 7 subjects believe that "Made in Germany" is more innovative on the explicit level, but on the unconscious level, the association between "Made in Japan"-"Innovation" is stronger. Finally, 2 individuals declare themselves neutral on the explicit level, but on the unconscious level, for one individual, the association between "Made in Japan"-"Innovation" is stronger, while for the other individual, the association between "Made in Germany"-"Innovation" is stronger.

Research limitations. *All the results illustrated, although characterized, in our opinion, by sufficient degrees of internal validity, were obtained in a laboratory setting using a sample that is not representative of the Italian population and, consequently, may present problems of external validity. To overcome generalizability problems, the*

results we obtained should be confirmed in more realistic contexts, resorting to representative samples of the population of interest and, possibly, establishing selective comparisons between COO labels in terms of perceived innovativeness with reference to specific product categories (e.g., automobiles, consumer electronics products etc.). In fact, our study currently records a kind of "generalized belief" (i.e., not referring to specific product categories) in innovativeness that Japanese products seem to have, in the eyes of Italians, both explicitly and implicitly, compared to German products. Finally, let us recall that the results of our study remain exclusively referable to one of the possible subsets of meanings (innovativeness) conveyed by the two COO labels compared.

Managerial implications. *The results confirmed our hypothesis that the Italians are inclined to more strongly relate the dimension of innovativeness to the COO label "Made in Japan" (relative to that "Made in Germany"). The measurements conducted on an explicit level showed a significant higher degree of perceived innovativeness toward "Made in Japan" products. Measurements on the implicit level also seem to go in the same direction; in fact, the IAT revealed a positive effect (a symptom of the robustness of the "compatible block" as opposed to the "incompatible block"). However, the differences that emerged upon closer joint analysis between implicit and explicit associations highlight the validity of the IAT as a complementary tool of the instruments traditionally used in marketing research. The results lead one to think that it might be useful to complement traditional research instruments (such as, for example, questionnaires) capable of measuring the explicit, consciously accessible component of cognitive and affective constructs of target customers with additional instruments, such as the IAT, capable of measuring the intensity of implicit constructs, unconsciously held by respondents (and potentially conflicting with what they state because of their desire to provide a certain, socially desirable, self-image).*

Regarding the specific topic we examined, the dual explicit-implicit approach should enable managers to obtain the cognitive and affective constructs of interest from time to time complete and reliable data and, therefore, to have a greater awareness of the choice of whether to emphasize (or not) the country of origin of a specific product based on the positive (or negative) association with the country itself and the consequent conceivable positive (or negative) impacts on business KPIs.

Originality of the paper. *Although the existence of country-related beliefs with reference to different product categories has long been known in the literature, we believe that our experiment presents novel elements, if only on the methodological level. Indeed, to the best of our knowledge, this is the first time that the COO-effect has been studied by also exploring the dimension of implicit cognitive and affective constructs (making use, in particular, of an Implicit Associations Test).*

Key words: *Country-of-Origin Effect; Implicit Association Test; Made in Germany; Made in Japan; Perceived Innovativeness*

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The Human Rights Cost of Service Value Chains: Outsourced Content Moderation in the Digital Economy

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Abstract

This work-in-progress study explores human rights abuses in global service value chains (SVCs), using the outsourced content moderation industry in Colombia as a case study. While extensive research has examined manufacturing GVCs, the governance of SVCs-particularly in the business process outsourcing (BPO) industry-remains underexplored. Content moderation, a critical yet largely invisible function in the digital economy, is outsourced to BPO firms, raising concerns about the workers' human rights, corporate accountability, and regulatory oversight. Applying a case study approach, this research investigates how multinational enterprises (MNEs), BPO providers, policymakers, and labor organizations shape the governance of outsourced content moderation. The study will collect qualitative data through semi-structured interviews with key stakeholders, including current and former content moderators, union representatives, and managers. These interviews will form the basis for preliminary findings, presented at the Sinergie-SIMA 2025 Management Conference to refine the study through scholarly discussion and feedback. By extending GVC and International Business (IB) research into the digital service economy, this study contributes to a deeper understanding of human rights issues in the digital economy.

Key words: *Service value chains, business process outsourcing, content moderation, human rights, Colombia, Teleperformance*

1. Introduction

Recent endeavors in international business (IB) research have shed light on the complexities of global value chains (GVCs) and associated human rights issues (Narula, 2019), such as forced labor, child labor, and unsafe working conditions (Caruana et al., 2021; Stringer & Michailova, 2018). Within this research stream, there is growing recognition that socially questionable practices often occur at lower-tier suppliers of multinational enterprises (MNEs) (Barrientos et al., 2011; Lund-Thomsen, 2020), requiring social upgrading, which refers to improving the labor conditions within GVCs while promoting the inclusion of underprivileged communities in economic activities (Gereffi & Lee, 2016). Infamous cases of human rights violations at Apple's Taiwanese supplier Foxconn (Lee et al., 2016; Mol & Lee, 2023), the Rana Plaza disaster in Bangladesh (Huber & Schormair, 2021), and child labor at Rangan Export, an Indian supplier of Ikea, (Bartlett et al., 2006) underscore the urgent need for interventions at the supplier level. A common feature of these examples is that they all relate to manufacturing in GVCs. However, considering the process of tertiarization, one of the most salient structural changes of the global economy (Jorgenson & Timmer, 2011), we argue that research may be overlooking facets unrelated to lower-tier manufacturing suppliers.

The overall growth of the service industry created the basis for establishing the global business process outsourcing (BPO) industry. Some of the most common services the BPO industry provided historically are customer service, sales, business development, customer retention, accounting and finance, and less frequently, more highly skilled functions, such as research and development (Lacity et al., 2011). Driven by digitization and the rise of social media, content moderation was added to the services. Content moderation refers to the screening of user-generated content (UGC) to guarantee compliance with the safety guidelines of social media, platforms, and websites that rely on UGC (Gillespie, 2020). It safeguards the companies' brand reputation while preventing operational disruptions caused by UGC that may be illegal, disturbing, or controversial. Content moderation is crucial for the general public as it significantly impacts user experience, and also influences freedom of speech (Eastwood, 2023; Jones, 2024). Although Artificial Intelligence (AI) has dramatically increased its capabilities, it is still far from being able to completely take over such an important, critical, and delicate job. Organizations still rely on humans to complete the parts of the job where AI falls short (Gillespie, 2020). However, content moderation has been colloquially defined as the "dirty work" of digital labor

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(Roberts, 2016) since in the back offices of Meta's, TikTok's, and Google's subcontracted BPOs, thousands of content moderators are forced to watch graphic and disturbing content such as child abuse, extreme violence, and animal cruelty (Eastwood, 2023; Jones, 2024; Roberts, 2016; Wamai & Kalume, 2023).

A landmark case highlighting the human rights risks in outsourced content moderation emerged in Kenya, where content moderators employed by Sama-a third-party BPO-were tasked with reviewing graphic and violent content for Facebook. These workers, many of whom were migrants and refugees, were exposed to distressing UGC daily with inadequate psychological support, leading to widespread reports of post-traumatic stress disorder (PTSD), anxiety, and depression (Booth, 2024; Hellerstein, 2023). When moderators attempted to unionize to demand better conditions, they faced employer resistance and blacklisting (Hellerstein, 2023; Reuters, 2023). In response, they filed a class action lawsuit against both Sama and Meta, challenging Meta's claim that it bore no responsibility as it had no direct employment relationship with the moderators (Kiplagat, 2024). Meta initially tried to circumvent the legal action, claiming it had no physical offices in Kenya and that was not the direct employer of the moderators, who were contracted by Sama (Kiplagat, 2024). Meta also attempted to shift operations to another provider, Majorel, and blacklisted former Sama employees from being rehired, but this move was blocked by the Kenyan government (Hellerstein, 2023; Reuters, 2023). Recently, a Kenyan court ruled that Meta, as the primary employer, was liable for the moderators' working conditions, setting a precedent for corporate accountability in outsourced digital labor (Hellerstein, 2023). However, the case is ongoing, with the potential to significantly impact the service value chains used by Big Tech companies in Kenya, as it seeks to hold Meta accountable for the well-being and human rights abuses of its content moderators. The legal battle highlights the struggle for fair labor practices and the responsibility of MNEs regarding the welfare of workers in their global service supply chains.

While GVC research has extensively examined human rights issues in manufacturing, the outsourcing of service labor-particularly content moderation-remains a largely overlooked area. Content moderation is a key function in the digital economy, yet the implications of its outsourcing, especially regarding human rights, and ethical and regulatory frameworks, are still not fully understood. Given the severe psychological toll on digital workers and the opaque nature of subcontracting arrangements, there is a pressing need to investigate how MNEs govern these outsourced service activities. Therefore, this study aims to explore the governance of outsourced content moderation within global SVCs, focusing on human rights issues, and regulatory implications. By extending GVC and IB research into the digital service economy, we contribute to a more comprehensive understanding of human rights and accountability in global outsourcing practices.

2. Theoretical framework

2.1 Conceptualizing the global service value chain

GVCs involve interconnected production steps spanning multiple countries, where firms add value at any stage. These networks vary in structure, with some resembling "spiders," where components are assembled in one location, and others functioning like "snakes," with sequential production across borders (Antràs & Chor, 2022). GVC research spans multiple disciplines, emphasizing governance structures from firm-level strategies to institutional frameworks (Kano et al., 2020). The global commodity chain framework, developed in the 1990s, categorized production networks into producer-driven and buyer-driven models based on power distribution (Gereffi & Korzeniewicz, 1994). Another framework identifies five governance types-market, modular, relational, captive, and hierarchical-shaped by transaction complexity, codifiability, and supplier capabilities. Industries often transition between these types, as seen in apparel and electronics (Gereffi et al., 2005).

The global production network (GPN) framework shifts focus from economics to the spatial and social dimensions of economic development. It highlights firm-region-global economy interactions, emphasizing the spatial organization of production and its role in global inequalities (Henderson et al., 2002). Building on this, the "GPN 2.0" model refines the approach, integrating both manufacturing GVCs and SVCs. It underscores competitive dynamics and firm-specific strategies, including intra-firm coordination, inter-firm control, and partnerships, to explain global production (Yeung & Coe, 2015).

The common aspect of previous research endeavors is that they are dominated by manufacturing-oriented perspectives. However, services account for approximately 70% of global GDP and an increasing share of international trade, signaling their growing importance in GVCs (Low, 2013). Despite these numbers, some authors argue that a distinction between services and manufacturing GVCs is irrelevant since production processes are interconnected, and it is difficult to separate manufacturing from service activities (Miroudot, 2019). In modern GVCs, goods are often produced with services, and services rely on manufactured goods, complicating their separation. Additionally, many manufacturing firms now operate as "factory-less" producers, focusing on design and branding while outsourcing production. While we agree with Miroudot (2019) that a differentiation between service and manufacturing GVCs could be considered obsolete from the perspective of income, comparative advantage, and productivity, we argue that from a social upgrading and human rights perspective, his assertion does not hold for three main reasons.

First, many contemporary supply chain laws are very specific with a focus on manufacturing GVCs, such as the European Conflict Minerals Regulation, rather than establishing holistic transparency requirements (Cobbe et al., 2020).

While the new EU Corporate Sustainability Due Diligence Directive (CSDDD) stands out in this regard and includes manufacturing GVCs and SVCs, the practical implementation of due diligence obligations varies significantly between the two sectors. In manufacturing GVCs, transparency has been a key focus of regulatory initiatives, corporate social responsibility (CSR) efforts, and technological advancements such as blockchain-enabled supply chain tracking (Sunny et al., 2020). However, unlike manufacturing GVCs, which involve trackable physical goods and traceable human rights abuses (e.g., forced labor and child labor), SVCs deal with intangible outputs such as digital labor, knowledge work, and BPO. Related human rights abuses, such as psychological distress, real-time worker surveillance, and precarious contractual arrangements, are unique to service industries and are not always adequately addressed within existing legal frameworks.

Second, governance structures within SVCs pose distinct challenges that further justify differentiating them from manufacturing GVCs. In manufacturing, governance models have been well-documented through frameworks such as buyer-driven and producer-driven GVCs, which describe how power is distributed among firms (Gereffi et al., 2005). However, governance in SVCs often involves more complex relational and captive governance structures, where service providers operate under significant control from lead firms without direct employment relationships.

Based on these two main premises, fostering the development of SVCs requires a differentiated policy strategy that prioritizes regulatory cooperation to address issues like regulatory divergence rather than solely relying on the reciprocal market-opening approaches typically applied to goods trade. On the contrary, leaving SVCs unaddressed creates a substantial gap in accountability for technology companies and digital service providers. This omission is particularly concerning given the increasing centralization of digital infrastructure and the growing reliance on complex SVCs. Additionally, the ambiguity surrounding technology companies' GVC practices limits regulatory oversight and consumer awareness. Therefore, the unique delivery modes, enabling roles, policy challenges, and measurement considerations collectively underscore the necessity of differentiating between service and manufacturing GVCs in analysis (Amador & Cabral, 2016; Heuser & Mattoo, 2017; Maurer et al., 2016).

The discourse on Business and Human Rights (BHR) has gained prominence in global policy over the past two decades. The United Nations (UN) defines BHR as the responsibility of states to protect human rights and businesses to respect them while ensuring remedies for victims. The Ruggie Framework and UN Guiding Principles emphasize corporate responsibility in business operations and relationships (Ruggie, 2011; Sanders, 2015). To meet this obligation, businesses must conduct human rights due diligence-identifying, preventing, mitigating, and addressing adverse impacts across their value chains. This process includes impact assessment, integration into operations, response tracking, and transparent communication. State-driven encouragement or regulation enhances GVC transparency, allowing stakeholders to evaluate corporate human rights performance (Ruggie, 2011; Sanders, 2015).

2.2 Global service value chains and the BPO industry

BPO is a practice where organizations outsource specific functions or tasks to third parties instead of handling them in-house. (Lacity et al., 2011). The BPO industry is overly complex, multifaceted, and growing constantly. Lacity et al. (2011) reviewed 87 articles about the BPO industry between 1996 and 2011 and identified that the most common reason organizations decided to outsource was, unsurprisingly, cost reduction. Furthermore, the secondary group of most relevant motivations included the possibility of focusing on core business, easy access to expertise, the need to improve performance, and the flexibility to scale the workforce up or down (Lacity et al., 2011).

The BPO market presents significant economic opportunities for organizations and governments, with substantial market capitalization and promising growth forecasts. The global BPO market is projected to reach US$414.81 billion in 2025 (Statista Market Insights, 2024). This indicates both a large current market size and a consistent expansion into the future. In addition, the importance of the BPO industry can be further emphasized by comparing it to other major and more visible sectors. For instance, while the global aerospace and defense industry reached about 0.8 trillion USD in revenue in 2023 (Statista Research Department, 2024), and the communication services market reached about 1.4 trillion in 2024 (Statista Research Department, 2024), the BPO market's growth and substantial size shows that it is not an industry to be overlooked.

Historically, the BPO sector has been dominated by India. Nonetheless, in 2010, India was surpassed by the Philippines, which has become the largest exporter of call center services in the world. The Philippines had a surprising growth from almost zero at the beginning of the millennium to almost 6 billion USD in 2010 and an astonishing compound annual growth rate (CAGR) of 65% in the first decade of the 2000s (Palugod & Palugod, 2011). As of 2022, the BPO industry in the Philippines employed between 3% and 4% of the national workforce and contributed to 7.5% of the Philippines' GDP (IBPAP, 2022). In addition, the IT and Business Process Association of the Philippines (IBPAP) forecasted that by 2028, the industry will employ an additional 1.1 million direct employees and double its revenue by 2028. This projected growth is expected to increase the industry's contribution to 8.9% of the country's GDP, making it the largest source of foreign exchange earnings in the Philippines (IBPAP, 2022). Moreover, each BPO job creates 2.5 indirect jobs, so the projected 1.1 million new direct jobs by 2028 could generate 2.7 million indirect jobs as well. (IBPAP, 2022). In conclusion, the remarkable growth of the BPO industry in the Philippines has solidified its position as a global leader in BPO services. With its substantial contribution to employment and GDP, this sector plays a crucial role in the country's economic development.

Another region that has seen explosive growth in its BPO industry is Latin America, but more specifically, Colombia. According to a recent report published by the Colombian "Ventanilla Única de Inversión", a public initiative managed by Colombia's Ministry of Commerce, Industry, and Tourism in collaboration with ProColombia (the country's investment promotion agency) and other governmental entities, as of 2023, the South American country became the third largest player in the BPO industry in the LATAM region, coming just right after Mexico and Brazil. The Colombian BPO industry contributes 3.5% of its GPD and generates more than 750,000 direct jobs (VUI, 2024). Colombia's appeal as a BPO destination is multidimensional, stemming from its strategic location being close to the United States and, therefore, having a similar time zone. Colombia boasts a large, skilled, and bilingual workforce capable of meeting the demands of the BPO sector, in addition to a growing Information and Communication Technology (ICT) sector (DTDA, 2023). While the minimum wage relative to the median and mean wages is high, the country still offers competitive labor costs compared to other more advanced economies (DTDA, 2023). Furthermore, government support is evident through active promotion of the sector, investment incentives, and programs designed to formalize jobs (VUI, 2024). These combined elements contribute to Colombia's attractiveness to BPO companies seeking a blend of strategic location, affordable and skilled workforce, and a reassuring economic, political, and regulatory landscape.

3. Case study

The French multinational and global market leader Teleperformance employs more than 60,000 employees in the Philippines, 40,000 employees in Colombia, and 400,000 employees globally (CCAP, 2024; Semana, 2024; Teleperformance, 2023). Teleperformance is not a name that most people would recognize, but their clients are certainly familiar to the public. Some include Big Tech powerhouses such as Amazon, Meta, and TikTok. (Eastwood, 2023; Jones, 2024; Suppa & Bureš, 2020). Teleperformance often receives certifications that guarantee they are a "Great Place to Work" (Teleperformance, 2024), but at the same time, there are countless news reports and social media posts that suggest the contrary (Antràs & Chor, 2022).

Conversely to these certifications, the Bureau of Investigative Journalism published a research article about the poor labor conditions and even human rights abuses of Colombian content moderators working for TikTok, subcontracted through Teleperformance. These moderators, who were tasked with reviewing graphic content such as murder, suicide, child abuse, and sexual violence, were found to be working under harsh conditions for as little as 10 USD per day (McIntyre, 2023; Perrigo, 2022).

The moderators reported experiencing occupational trauma and hazardous working conditions that negatively impacted their mental health. They faced inadequate psychological support while being subjected to demanding performance targets, punitive salary deductions, and extensive surveillance. They were expected to review as many as 900 videos daily with strict supervision and timekeeping (McIntyre et al., 2022). The psychological support offered by Teleperformance was mostly described by employees as insufficient, and in some cases, non-existent. The company also utilized extensive surveillance systems, including cameras in employees' homes, to monitor their remote workers. These conditions led to symptoms such as severe depression, anxiety, and sleep loss (McIntyre et al., 2022).

These revelations led to extensive negative media coverage and prompted the Colombian Ministry of Labor to investigate Teleperformance (Perrigo, 2022). Following the announcement of the investigation, Teleperformance's stock price fell by 34%, and trading was temporarily halted. The company responded by announcing a 150 million EUR share buyback, claiming it was a good use of available funds rather than acknowledging it as a crisis mitigation action (Valora Analitik, 2022).

In addition, workers' attempts to unionize and improve their working conditions were met with resistance from Teleperformance, including intimidation and harassment of union organizers. Teleperformance even filed a legal claim against a Colombian union, which was seen as an attempt to intimidate workers (McIntyre, 2023; McIntyre et al., 2022). Despite these actions, Teleperformance eventually signed an agreement assuring its more than 40,000 workers in Colombia the right to form a union (UNI Americas, 2023). The agreement also allowed union organizers access to the workplace and created communication channels with management. This was the first national-level implementation of a global agreement to improve labor rights in the French multinational. This agreement resulted from negotiations between Teleperformance, Utraclaro (a Colombian union representing IT and call center workers), and UNI Global Union (UNI Americas, 2023).

Although, after the scandal, it was reported that Teleperformance would no longer offer content moderation services in Colombia, the role remained active on its career's website, though under a different job title (Cerosetenta, 2023). It was reported that the company has since made some improvements, including more flexible work hours that have impacted the worker's salaries negatively (Cerosetenta, 2023). Despite this, Teleperformance's CEO, Daniel Julien, stated that the allegations against the company were unfounded and had been unfairly criticized (Semana, 2024b). Daniel Julien also stated that Teleperformance has a good relationship with the Colombian government and the Ministry of Labor (Semana, 2024b). The case of Teleperformance in Colombia highlights the significant challenges content moderators face and the potential for exploitation in the BPO industry. Though far from perfect, this case is a model for how unions and BPO companies can work together to improve working conditions.

4. Research outlook

This study is a work-in-progress that aims to deepen the understanding of global SVCs by investigating related human rights issues, governance structures, and regulatory implications in outsourced content moderation. While GVC research largely focuses on manufacturing, we extend this to service industries, particularly the BPO sector. Using a qualitative design, we will conduct semi-structured interviews with current and former workers, unions, civil society organizations, and managers, alongside document analysis and case study methodology. The study will focus on Colombian content moderators subcontracted by Teleperformance, a BPO firm servicing major tech companies like TikTok and Meta. By integrating GVC theory, labor governance, and business and human rights frameworks, this research contributes to discussions on social upgrading in service industries, informing both academic debates and policy on outsourced digital labor.

As part of the next steps, we will refine our theoretical framework and finalize data collection with the aim of presenting preliminary findings at the upcoming Sinergie SIMA Conference.

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Sustainability and Global Value Chain Dynamics: Evidence from the Plastic Industry

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Abstract

Global Value Chains (GVCs) are undergoing significant transformations driven by Environmental Sustainability (ES) pressures. While extensive research has been devoted to the sustainability strategies of multinational enterprises (MNEs), the specific contributions and adaptive responses of Small and Medium-sized Enterprises (SMEs) to these evolving sustainability imperatives remain insufficiently explored. The role of SMEs in sustainable development is not only complementary to the strategies of MNEs but also critical in closing the sustainability loop and ensuring that important supplementary aspects are not overlooked. By adopting a multiple case study approach, we conduct an in-depth longitudinal analysis of three Italian SMEs in the plastic sector-a highly regulated and environmentally scrutinized industry which is undergoing profound changes. The analysis adopts a Reflexive Thematic Analysis (RTA) on interview data to explore how sustainability-related imperatives reshape the value chain in which SMEs are embedded, the technological investments, their business models and supplier-customer relationships. Preliminary findings indicate that sustainability pressures impact SMEs to adopt new strategies in terms of location, governance, and control aspects (Buckley & Strange, 2015). However, our findings highlight also both enabling and constraining factors for SMEs, including tensions between regulatory compliance, cost constraints, and market expectations. This study contributes to International Business (IB) literature by bridging the gap between ES and GVC research, emphasizing the role of SMEs in fostering GVCs' sustainable transitions. By identifying key drivers and barriers to adaptation, this working paper offers insights for policymakers and entrepreneurs seeking to enhance GVC resilience and sustainability. Future research will further examine these dynamics as additional data is going to be collected.

Framing of the research. *GVCs are undergoing profound changes (De Backer & Flaig, 2017; Zhan, 2021) due to an evolving global scenario characterized by the great environmental crisis (Ghauri et al., 2018). As the direct link between MNEs' activities and the deterioration of the global environment (Ghauri et al., 2021; Kolk & van Tulder, 2010) is now largely acknowledged, companies are increasingly confronted with the imperative to adopt ES practices (Carmine & De Marchi, 2023) to reduce their environmental footprint all along the GVC. ES refers to companies' ability to minimize environmental harm while meeting international production and supply standards, involving operations (Le et al., 2024) such as adopting eco-efficient technologies, reducing waste and emissions, and complying with environmental regulations across different countries. In this line of thought, companies often face both pressures and opportunities to innovate sustainably due to the demands of leading firms and global market expectations. However, the way firms embed ES into their strategies is shaped not only by internal resources and network relations (Arevalo et al., 2011; Castaldi et al., 2023) but also by structural decisions around the location, governance and control of their activities.*

Traditionally, MNEs have been seen as the central orchestrators of GVCs governance, setting ESG standards and cascading these requirements down to SME partners, particularly suppliers and customers (Gereffi & Lee, 2016). SMEs in this model are often portrayed as reactive agents, adjusting to external pressures rather than shaping the governance agenda themselves. However, this perspective overlooks the increasing strategic and organizational sophistication of certain SMEs-especially those that operate as micromultinationals (Dimitratos et al., 2003). These firms not only engage in cross-border activities but also actively coordinate international operations, invest in sustainability-driven innovations, and influence upstream and downstream partners. The advent of these alternative orchestrators within the global trade context complicates the conventional GVC's hierarchy and calls for a more nuanced understanding of the decision-making processes concerning location, governance and control, and their evolution in conjunction with the implementation of ES strategies.

Generally, as Fratocchi and Di Stefano (2019) highlight, decisions concerning production activities' location have a large impact on firms' sustainability. Specifically, some companies could be incentivized to reshore their plants to advanced economies (Tate, 2014; Heikkilä et al., 2018) to pursue more sustainable manufacturing by exploiting technological advantages. While, on the contrary, companies operating in highly polluting sectors could find better

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choosing to locate their plants in countries with laxer regulations (Sawhney & Rastogi, 2015). In this way, scholars agree that GVCs' location choices are shaping environmental impact geography (Gereffi, Lim & Lee, 2021).

Governance mechanisms are increasingly embedding ES metrics, influencing both firm behavior and accountability structures (Negri et al., 2021). According to Zhan (2021), ES functions as both a driver and an outcome of GVC evolution, closely intertwined with technological innovation, economic governance, and organizational resilience. Technological advancements such as energy-efficient systems and green solutions are simultaneously enabling and being spurred by ES pressures (Nižetić et al., 2019).

Understanding GVC dynamics requires attention to both the geographical dispersion of activities and the mechanisms through which control is exercised-including ownership, contractual arrangements, and informal coordination (Buckley and Strange, 2015). These control mechanisms significantly influence environmental outcomes, especially in sectors where compliance and standards vary across ways.

Purpose of the paper. *Recent studies have posed increasing attention toward ongoing GVCs' trends and dynamics (e.g. Lee & Gereffi, 2015; Strange & Zucchella, 2017), often taking leading MNEs' perspective (e.g. Barford & Ahmad, 2023; Burritt et al., 2020; Magnani et al., 2019). SMEs that compose the extended network of supplying and supporting activities have been overlooked, with very few articles taking this perspective (e.g. Amal & Rocha Freitag Filho, 2010; Denicolai et al., 2021; Sinkovics et al., 2021). Moreover, the majority of studies focus on firm-suppliers relationships, with less attention given to micromultinationals' development, looking particularly at how sustainability interplays in the relationship with international customers and which tensions and paradoxes arise.*

In the current changing scenario, businesses are perceived following sustainability as a branding tool, constraining it with economic considerations (Trollman & Colwill, 2021), thus facing increasing trade-offs synergies. This raises critical questions about how firms navigate these trade-offs and whether necessary organizational capabilities or governance structures enable them to manage conflicting objectives effectively. Furthermore, debates persist regarding which dimensions - environmental, social, or economic - tend to dominate decision-making processes, particularly under financial or operational constraints.

This study aims to address these research gaps by providing evidence from a representative industry. Hence, this study aims to contribute to IB research by answering the following research question: How does ES influence GVCs dynamics? Specifically, our objective is to investigate GVCs' dynamics in response to ES pressures and, by taking an SMEs perspective, highlight drivers and barriers to strategies' adaptation.

Methodology. *This paper adopts a multiple case study methodology (Edmondson & McManus, 2007; Sinkovics et al., 2008; Aaboen et al., 2012). The qualitative approach has been chosen in light of this research's exploratory nature (Halinen and Törnroos, 2005). Specifically, we conduct an in-depth longitudinal retrospective analysis of three Italian family-owned SMEs operating in the plastic industry. These three family-owned firms stand out for diverging from the traditional family business model. While retaining their entrepreneurial heritage and values, they have evolved into professionally managed organizations with well-defined governance structures that extend beyond the founding families. This blend of familial legacy and professional management enables them to maintain agility while ensuring long-term sustainability and competitiveness in the global dynamic industrial markets.*

The choice of this specific sector is motivated by the relevance and diffusion of this material in every aspect of today's society and business activities. Its characteristics make it easy to produce in large quantities and for multiple purposes, so it is integral to many other industries, such as packaging, automotive, and construction, making its production and consumption patterns vital to GVCs. However, it also faces significant environmental challenges, including pollution, waste management, and reliance on fossil fuels, highlighting the need for sustainability and circular economy initiatives. At the same time, the sector presents opportunities for innovation, with advancements in biodegradable plastics, recycling technologies, and alternative materials addressing environmental pressures. Moreover, stringent regulations and international agreements targeting plastic use and waste management drive organizational adaptation, providing valuable insights into corporate responses to evolving policy (Zucchella et al., 2022). In this context, the present research aims to catch the transition toward ES in the GVCs, highlighting the key factors that enter into play.

Dyer & Wilkins (1991) justify the small number of cases as it allows for a more accurate analysis of the entities under investigation. Purposeful sampling (Patton, 1990; 2014; Dubois & Araujo, 2007) was used to select the cases, leveraging the researchers' professional network to engage with companies in the industry. The adopted selection criteria aim to identify Italian SMEs in the mentioned sector and operate internationally through direct investments and business networks so that we can identify and analyze GVC dynamics from their point of view.

Company A is a small family-owned business established in Northern Italy in 1965, which produces plastic bags for waste collection made of recycled polyethylene, mainly sourced from post-consumer packaging waste. Thanks to this specialization in plastic recycling and recovery, the company has always been ahead of its time in its ES commitment and circular economy practices, gaining over time a robust and recognized reputation. Today, the company remains a family-owned business with a significant international footprint, expanding its supplier network from 70 to 78 partners within the past 5 years, of which 18 are considered particularly reliable. Most of this network is located in Italy, which helps reduce transportation costs given the bulky nature of the materials. Its export-to-sales ratio stands at 80%, with around 68 customers located in France and Germany, alongside newer expansions into Danish and Finnish markets. In these two markets, the demand is mainly driven by local municipalities and public waste collection companies characterized by high levels of environmental awareness and requiring detailed audits concerning production processes and sustainability measures before committing to orders.

Company B is a medium-sized family-owned business established in 1969, now led by the founder's son. It is a key player in expanded polystyrene (EPS) packaging solutions for household apparel and furniture but has expanded its capabilities to also serve the pharmaceutical, food, and construction industries. Company B has developed its technological capabilities to meet large MNEs' demand for high-quality and sustainable packaging solutions and increased the sourcing of materials to provide different combinations of wood, cardboard, and recycled EPS. The company is highly internationalized, with three production plants and a warehouse in northern Italy, one plant in the UK, and another one in southwestern Turkey. In recent years, due to the evolution of household apparel's GVC in which it operates, the company is preparing to close its local manufacturing plant in the UK, empowering its presence in Turkey and entering into a joint venture in Thailand. Their suppliers include large petrochemical MNEs located in Italy, Norway, Germany, Greece, Turkey and China. Company B is almost a one-material business as 80-85% of its suppliers provide liquid chemicals on which EPS production is based, but they also source small quantities of recycled EPS, renewable materials, such Biofoam and cardboard, and accessories such as wood and TCH. Downstream, Company B's primary customers are large MNEs in the domestic appliance industry, followed by smaller customers in the food, pharmaceutical, and construction sectors, with a growing emphasis on high added value insulation products for residential and industrial applications.

Company C is another medium-sized family-owned firm, established in 1972, now led by the second generation, and focused on producing polyolefin films for food and industrial packaging and surface protection. Since its foundation, the company has committed to creating innovative packaging that responds promptly to market trends, social and ethical awareness, environmental protection, and pollution reduction. Every product is thus an effective, sustainable solution to the varying needs of a changing world. To achieve this objective, company C has engaged in continuous product innovation processes, establishing solid partnerships with universities, laboratories, and scientific institutions in Italy and around the world. Even Company C's main suppliers and most significant partners are petrochemical MNEs that provide granules from which polyethylene is made. Downstream, Company C's products are exported worldwide through different channels. Notably, the company has two sales offices in North America and the Russian Federation, while in Europe and Italy –where they generate most of the revenues (55% from Italy)– the company distributes its product with its sales managers; customers in Africa, South America, and Asia are instead managed through intermediaries.

At now, primary data have been collected through multiple semi-structured interviews (Aaboen et al., 2012), conducted over time either face-to-face and video-call meetings with key informants involved in the organizations (Table 1) and lasting between 60 – 90 minutes each. We adopted an interview guide with multiple open-ended questions (Granot et al., 2012) covering companies' evolution, internationalization processes, and sustainability strategies. Each interview was recorded and then transcribed in English and verified by bilingual (Italian and English) speakers. In both cases, we triangulated (Patton, 1999) our evidence with secondary data gathered from websites, corporate sustainability reports, and social media activities. Initial insights are gathered as research reports to be sent to the informants. Clarifications and further details were also requested from them.

Tab. 1: Key informant list. Source: Our elaboration.

Company A		***Company B***		***Company C***	
Year	***Informant Role***	***Year***	***Informant Role***	***Year***	***Informant Role***
2020	*CEO*	*2020*	*CEO (x2)*	*2019*	*CEO*
2020	*Purchasing & Environmental Office*	*2024*	*CEO*	*2019*	*Chief Communication & Sustainability Officer*
2024	*Purchasing & Environmental Office*	*2024*	*Sustainability Manager*	*2025*	*Chief Communication & Sustainability Officer*
				2025	*R&D Manager*
				2025	*Communication Specialist (x2)*
				2025	*Sales Manager*

Data Analysis adopted the RTA six-phase approach (Braun & Clarke, 2019, 2021; Byrne, 2022), selected for its flexibility and ability to uncover nuanced insights into complex phenomena. Currently, the researchers immersed themselves in the data during and after collection, repeatedly reading the interviews to gain initial insights. Codes were collaboratively and reflexively generated from the data, forming the foundational building blocks for themes. In the next steps, initial themes will be actively developed through iterative engagement with the codes and further refined and combined to ensure coherence and relevance. Themes will then be renamed and defined to accurately reflect their essence. Finally, the findings are synthesized into a conceptual model that integrates the key themes, providing a comprehensive understanding of sustainability's influence on GVC dynamics. As the work is still in progress and the results are still at a preliminary stage, their presentation is provisionally organized according to Location, Governance, and Control topics.

Results.

– *Location dynamics*

Company A reflects the classical SME's configuration with vertically-integrated production activities localized into a single place, embedded into a network of suppliers and customers. The economy's green transition enabled a significant increase in market opportunities and, in addition to the traditional markets of France and Germany, Company A is now diversifying its sales by exporting in the Scandinavian countries, capitalizing on the growing demand for environmentally responsible products in these regions, where high environmental awareness drives demand for sustainable products.

Company A's decision to keep the majority of its suppliers in Italy helps reduce transportation costs, leveraging geographic proximity for cost efficiency and reducing carbon emissions from transport, also reflecting its ES commitment.

Due to the EPS products' characteristics, Company B adopted a "shop-in-shop" strategy, which implies purposefully locating production plants strictly close or within main customers' premises to minimize transportation costs. From this point of view, Company B's location strategy is affected by external events other than ES as it is chained to customers' location choices. As a matter of fact, Company B is now moving the plants from the UK to Thailand on the way of household apparel companies that changed their strategies to penetrate Southeast Asian and Chinese markets, also benefiting from less stringent environmental policies. Company B also reports significant benefits from having production spread over several countries, as they prove to be not only valuable sales and production hubs but also important supply centres, such as the Turkish ones.

Company C concentrates the production in its single Italian plant and benefits from a well-established European supply chain with a high degree of logistical efficiency. The choice of concentrating the main activities there is also motivated by the growing relevance of the R&D unit, which continuously improves products' quality and specific characteristics, and by a better control over the consultancy and services suppliers' network. Downstream, other than operating through intermediaries in Africa, Asia and South America, Company C possesses two sales offices in the USA and Russia, aiming to penetrate deeper into the market and provide faster and more direct assistance to its customers.

- *Governance dynamics*

Company A's GVC structure reflects a business network composed of small-medium actors without a prominent orchestrator. Specifically, Company A's suppliers are small and medium-sized local companies that supply it with their plastic waste, such as nylon packaging, but also intermediaries active in waste disposal and brokers specialized in collecting this material at the European level play an important role. Company A pointed out that the economy's green transition implied an increasing number of competitors attracted by the fast-growing market, which fostered price-based competition both on product placement and supply sourcing. For this reason, the company also tries to cultivate its relationships with intermediaries as well as with long-standing partners to have a wide range of possibilities to draw on. On the customer side, the situation is not dissimilar, as Company A serves several retailer customers or intermediaries specialized in waste treatment products but also municipal waste collection companies. Again, Company A relies on strong ties with long-term customers, leveraging its renowned identity of "pharmacists of plastic" and competing on quality rather than on price.

On the contrary, GVC structures of both company B and C denote clear power dynamics, as the two companies operate between large orchestrators on both supply and market sides. Specifically, Companies B and C source their oil-derived plastic supplies from the same large petrochemical MNEs. Both companies' respondents remark this is inevitable since these suppliers not only control the production of virgin plastic but, currently, are also the only producers of chemical-recycled plastic, the only recycled material regulations allow for packaging in the food industry. Suppliers of mechanically recycled plastic are therefore excluded from this sector. On the market side, companies B and C offer their packaging services to several large MNEs in multiple sectors. Specifically, Company B is more focused on the household appliances industry while Company C provide packaging solutions for famous brands in the food sector. Both companies point out that doing business with these large MNEs brings great benefits in terms of market opportunities and prestige but, on the other hand, there are considerable pressures in terms of increasing quality and focus on sustainability as well as cost containment. This leads to a paradox in the green transition process led by MNEs, which externalize the costs of sustainability investments onto their suppliers, limiting their profit margins. For this reason, the two companies have adopted a market diversification strategy over time, turning their offerings to other companies and other sectors. For instance, Company B also expanded into the fish market, while Company C entered the furniture and household appliance market.

- *Control dynamics*

Company A controls all the production process of its GVC, providing an end product ready to be sold by intermediaries or used by waste collection public companies. From this point of view, the company proves to be quite autonomous in its choices, although it still has to maintain high standards of sustainability and quality to intercept market demand. The increasing pressure from new competitors, however, makes it essential to maintain strong relationships with both suppliers and major customers so that the company always has a sufficiently large supply base to keep production going and enough revenues to finance its business.

By operating in close relationship and coordination with large MNEs, Company B and C control only those complementary activities to the main products produced by the orchestrators, which externalize packaging manufacturing to specialized suppliers as it is not convenient to integrate it internally. However, Company B notes that its packaging is crucial for the household appliance industry because without it, delicate products could not come off the assembly line or even be stored. The choice to operate via the shop-in-shop strategy we mentioned above therefore proves to be both functional and successful. The same applies to Company C, although it is not necessary to locate production facilities directly within those of MNEs as its product can be easily transported and implemented in customers' machines.

However, all three companies emphasize that sustainability standards are imposed by the customer, which therefore exerts a strong influence on product design and communication style.

Research limitations. *This study has several limitations. First, it is a working paper and the level of analysis can be limited at the moment. However, preliminary information gives us a fairly organic picture with several similarities. Second, the focus on three Italian SMEs in the plastic industry limits the generalizability of findings to other sectors and*

firm sizes. Third, while the qualitative multiple case study approach provides rich insights, it is subject to informant potential bias and interpretation challenges. Additionally, the study's time frame may not fully capture long-term structural shifts.

Managerial implications. *Our findings provide useful examples to entrepreneurs and practitioners who operate in SMEs involved in GVCs, facing the double pressure of increasing sustainability demand and market competition imperatives. Notably, the three successful cases we presented demonstrate how product and process innovations combined with internationally-oriented networked strategies allow even small companies to sustain the growing competition enabled by leading MNEs. The research also aims to encourage SMEs to pursue environmental sustainability even in problematic sectors, such as plastic packaging, as it has now become a prerequisite for entering into business relationships as well as for gaining competitive advantages and taking further steps towards net-zero business models.*

Originality of the paper. *Moving beyond the traditional research focus on large MNEs, this paper provides an overview of SMEs' strategies to embrace the increasing sustainability demand and mitigate the market imperatives that currently characterize GVCs. More in depth, we traced GVCs dynamics from SMEs perspective, particularly looking at their sustainability-oriented strategies. Findings suggests that investments in product and process innovations are driving the evolution of the plastic industry toward green transition, not only by seeking to replace fossil sources with new and sustainable materials but also by improving recycling processes and reducing consumption. In this sense, findings suggest progress have been made, but their costs are still too high to be competitive in global market settings. Specifically, we highlight the paradox of large MNEs' behaviors, which demand increasing ES to their suppliers but are not willing to sustain higher costs, forcing their partners to adopt strategies to mitigate these power dynamics. We saw how SMEs diversify their customers and suppliers network to reduce their dependence and increase the variety of their business activities, eventually extending their presence abroad with FDIs or strengthening relationships with local partners. In doing so, investments in communication and environmental certifications are recognized fundamental, as they increase company's reputation and enhance the establishment of new relationships with customers.*

Keywords: *Environmental Sustainability; Global Value Chains; Plastic Industry; Reflexive Thematic Analysis; SMEs.*

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Delving Into the International Dimension of Activist Entrepreneurship in Fashion

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Abstract

This paper aims to explore the international dimension of activist entrepreneurship. Specifically, the conceptualization of activist entrepreneurship as an unconventional form of entrepreneurship is a relatively recent development in the existing literature. The research presented in this work undertakes an empirical investigation of a qualitative case study involving an activist entrepreneur in the fashion industry. This sector, due to its intrinsic characteristics and the prevailing demand for sustainability, represents a fertile ground for studying activist entrepreneurship. The paper addresses the following research question: How and to what extent does the international dimension shape activist entrepreneurship? Thus, the study offers an original empirical approach to the topic, linking it to the international dimension. The findings reveal that internationalization is characterized by an imbalance favoring activist practices over business growth. However, activist entrepreneurs require a comprehensive cross-border vision to promote their advocated cause.

Framing of the research. *The theme of activism is highly relevant in contemporary times, significantly driven by global concerns such as geopolitical tensions, armed conflicts, the climate crisis, sustainability imperatives, energy transition, and increasing digitalization. Discussing activism requires considering the mobilization of protest movements, the aggregation of individual voices, and organizing collective actions by groups (George and Leidner, 2019). The existing academic literature has explored activism with specific reference to social and consumer movements. Recognizing the pervasive influence of consumption in modern society, consumer movements aim to alter established consumption and marketing paradigms as a specialized subset of social movements. They accomplish this by promoting alternative consumption ideologies that significantly deviate from, and often radicalize, mainstream viewpoints (Kozinets and Handelman, 2004). A conceptual model of social movement ideology proposes three key representational dimensions: the public articulation of the movement's goals, the collective self-representation of its followers, and the characterization of its perceived adversary (Touraine, 1981; Melucci, 1989). For example, Slow Food is a global movement working to ensure good, clean, and fair food for all; this has also spurred the emergence of the Slow Fashion movement, which advocates for sustainable production paradigms as a counterpoint to the rapid-cycle collections prevalent in fast fashion (Pookulangara and Shephard, 2013). The role played by the founder of an activist consumer movement is crucial, as it can be viewed as an orchestrator of members (Barès and Cova, 2023). At the same time, brands and corporations can also participate in activist initiatives, reflecting their core values. The adoption of explicit positions by brands on contentious social issues and actions intended to shape societal evolution constitutes brand activism-a practice capable of inducing significant transformations within both market and societal structures (Sarkar and Kotler, 2018; Vredenburg et al., 2020). Simultaneously, firms that engage in corporate activism demonstrate a clear commitment to fostering societal transformation through the public articulation of positions on social, political, economic, and environmental issues; corporate activism seeks to reshape the attitudes and behaviors of actors within the relevant institutional landscape (Eilert and Nappier Cherup, 2020). Furthermore, existing literature acknowledges CEO sociopolitical activism, as CEOs are increasingly likely to engage in public discourse regarding socially divisive matters (Hambrick and Wowak, 2021).*

In this scenario, recent scholarly work has brought to light the concept of activist entrepreneurship (Monteverde et al., 2024), defined as an unconventional form of entrepreneurship. Beyond the traditional paradigm of rational profit-seeking, an entrepreneur's commitment can stem from various motivations, such as passions related to individual skills and leisure activities (Guercini and Cova, 2018). Activist entrepreneurs take on a dual role: they are both entrepreneurs and activists advocating for a specific cause, often by establishing businesses where profit serves as a means to achieve a greater purpose. These entrepreneurs are the founders of their organizations. They embrace a cause and become its spokesperson, aiming to create change.

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Additionally, they build a community of supporters who champion the same cause, linking the individual experience with the collective community. Furthermore, activist entrepreneurs utilize offline and online methods to pursue their goals without geographical limitations, extending beyond the local context (Monteverde et al., 2024). The relationship between entrepreneurship and activism has been explored in academic literature for some time, albeit often in a subtle manner. For example, Vedula et al. (2022) introduce the notion of "entrepreneurship for the public good", while Abebe et al. (2020) depict entrepreneurs as agents of social change, examining the interplay between passionate activism and entrepreneurial skills. Moreover, the concept of "eco-entrepreneurship", as discussed by Mars and Lounsbury (2009), reconciles the two frameworks of market and social activism. In this discussion, Pacheco and Khoury (2023) analyze social movements and their impact on entrepreneurial activities. Another stream of literature considers the political potential of entrepreneurship as a practice of solidarity and social change, examining it as a means to achieve political transformation (Alkhaled, 2021).

Given the increasingly global nature of the causes promoted by activism and the characterization of activist entrepreneurs as operating beyond geographical borders, there is a pressing interest in understanding the significance and role of the international dimension within activist entrepreneurship. In this context, two relatively distinct bodies of literature can be identified: the international dimension of activism and the international dimension of entrepreneurship. Regarding the first, the international character of activism can be traced to the rise of movements that span borders through international mobilization, which Tarrow (2005) refers to as transnational activism. In the framework of transnational activism, internationalization involves multi-level interactions-horizontal and vertical-between state and non-state entities operating at international, national, and subnational levels, creating formal and informal institutional networks (Stanbridge, 2005). From this standpoint, global activism becomes a central theme for examining the international aspect of activism, particularly focusing on global brands that engage in brand activism (Tsougkou et al., 2024). Conversely, the international dimension of entrepreneurship aligns with a different academic discourse. In international entrepreneurship, identifying and exploiting opportunities to create products and services occur across national borders; entrepreneurial founders and companies seek opportunities on a global scale (Oviatt and McDougall, 2005; Zucchella et al., 2023). Firms can operate with a strong global vision, treating the world as their only market reference (Guercini and Ceccarelli, 2020). Therefore, to bridge the gap and contribute to existing literature, this paper investigates the international dimension of activist entrepreneurship.

Purpose of the paper. *The paper aims to answer the following research question: RQ) How and to what extent does the international dimension shape activist entrepreneurship? In other words, while the existing literature offers insights into the international aspects of activism and entrepreneurship separately, we seek to understand how these elements manifest when activism and entrepreneurship intersect. Therefore, the international dimension of activist entrepreneurship could be characterized by a balanced integration of international aspects drawn from both activism and entrepreneurship fields. Conversely, there may be a predominance of one component over the other. Finally, novel perspectives may emerge.*

Methodology. *Given the exploratory aim of this study, a qualitative methodology was deemed appropriate (Voss et al., 2002). Specifically, to address our research question, we employed a single case study design (Eisenhardt, 1989; Yin, 2014), focusing on an Italian activist entrepreneur within the sustainable fashion sector. Unfortunately, the fashion industry is notoriously criticized for its adverse impact on sustainability, making it a central player in the broader call for sustainable practices (Akrout and Guercini, 2022). In particular, fashion ranks among the world's most polluting industries (Mok et al., 2022). The detrimental effects of the fashion system are evident across all three dimensions of sustainability. Indeed, concerns are raised not only regarding environmental issues but also about numerous criticalities that exist at the social and economic levels. This landscape has prompted some entrepreneurs to establish sustainable new ventures within the fashion sector, which are companies founded on sustainable business models from the outset (Runfola and Monteverde, 2023). Similarly, streams of literature such as social entrepreneurship and sustainable entrepreneurship underscore companies' need to generate value beyond mere economic outcomes (Bacq and Janssen, 2011; Shepherd and Patzelt, 2011), including in the fashion context. At the same time, as fashion significantly influences cultural norms, trend dissemination, and consumer behavior, it presents a receptive environment for activist interventions (Lee et al., 2024). In this vein, encompassing individual and collective actions, fashion activism often intersects with social movement initiatives (such as the Slow Fashion movement). Activists, driven by principles of solidarity and a desire for social reform, typically engage in actions that extend beyond personal gain. In the fashion realm, their efforts are directed toward achieving "social justice, environmental stewardship, economic prosperity, and cultural regeneration" (Mazzarella and Black, 2023, p. 234). Therefore, the fashion sector provides a fertile ground for exploring activist entrepreneurship, especially in light of the pressing demands for sustainability.*

This paper focuses on a case study of an activist entrepreneur championing sustainable fashion and founding a sustainable fashion company. We intentionally selected this case study for its potential to reveal insights (Coviello and Joseph, 2012). For confidentiality reasons, we refer to the individual as W.M. and the company as Zeta. Drawing from prior experience in the fashion sector, W.M. co-founded Zeta, an innovative start-up, in 2015. A notable feature of this firm is its capability to dye t-shirts using recovered, non-toxic industrial byproducts. By 2020, the company had evolved, expanding to offer design and consultancy services for brands seeking to incorporate sustainability beyond just the fashion context. Zeta also enhanced its offerings by developing and delivering educational programs and courses designed to spread knowledge about sustainability issues to students, policymakers, and corporate executives.

Meanwhile, W.M.'s commitment to activism remained steadfast. Recently, W.M. has engaged in political advocacy, forging connections and taking on roles within the European Commission. Concurrently, in support of the advocated cause, W.M. organized significant protests, including impactful online mobilizations, such as the one in 2021 against a major multinational corporation that recently launched a new streetwear collection. Furthermore, W.M. has established extensive international ties with a prominent global fashion activism movement; W.M. has been helpful in the movement's expansion into Italy and currently serves as Vice President. Among other initiatives, W.M. contributed to the publication of a book, in collaboration with a United Nations organization, addressing sustainability themes. To maximize outreach, this publication was translated into seven languages. Additionally, W.M. traveled to numerous countries affected by Western overconsumption to produce a television series to raise awareness about the damage inflicted by the current fashion system.

For the data collection phase, we considered multiple sources. Firstly, we realized, recorded, and transcribed verbatim an in-depth, face-to-face, and semi-structured interview with the activist entrepreneur. In addition, we conducted desk research and gathered secondary data from, for instance, already published interviews, news articles, websites, and social media pages. Finally, we relied on non-participant observation of activities conducted on the primary social media platforms used by the activist entrepreneur, the founded company, and the related social movements. The data collection phase spanned from 2021 to 2024. Triangulation between the different sources increased the credibility of the data in this research (Creswell and Miller, 2000). The data analysis generated insights through an abductive approach of systematic combining (Dubois and Gadde, 2002), where data analysis was intertwined with data collection (Eisenhardt, 1989), fostering a continuous interaction between data and theoretical constructs.

Results. *The findings of our empirical investigation show that the international aspect of activist entrepreneurship tends to align more with the internationalization of activist practices-aimed at amplifying the resonance of the advocated cause-rather than with the internationalization of the business and its enterprise. Therefore, internationalization appears to be driven by unconventional motives instead of traditional ones.*

Indeed, activist entrepreneurs engage internationally to strengthen and advance their championed cause. Consequently, the international dimension manifests in the activist entrepreneur's desire and ability to establish international relationships and connect with networks beyond local boundaries to promote the cause, reinforcing the community of followers. These connections predominantly involve social movements, institutional entities, associations, and non-governmental organizations.

This study does not identify an inherently international aspect of the enterprise; the company does not extend its product sales into foreign markets, remaining primarily confined to the domestic context. The enterprise generates profit in pursuit of a higher purpose. It enables activist entrepreneurs to manage a company based on their deeply held values, potentially setting a benchmark for other firms. Moreover, the dual role of entrepreneurs and activists allows these individuals to bridge the business and activist domains, facilitating a comprehensive understanding of both perspectives and enhancing their mobilizations' effectiveness. The activist entrepreneurs' focus is not on expanding their enterprises into international markets but on the global dissemination of the advocated cause; the established company can support this, particularly in building network relationships with business and non-business actors that align with its mission. This does not imply that the company cannot expand internationally; rather, the activist mission takes precedence over entering foreign markets, resulting in a slower growth trajectory abroad. Still, the international dimension is significant and is represented in the figure of the entrepreneur. Activist entrepreneurship exhibits an international dimension to the extent that it primarily facilitates the dissemination and awareness of the advocated cause, as seen in the sustainable fashion cause analyzed in the case study. As an entrepreneur rather than just an activist, it enhances advocacy for the cause. Even without direct international sales, the company possesses a cross-border resonance; this international notoriety aids in bolstering support for the activist cause. Therefore, the company also serves as a tool that promotes international networking activities for the entrepreneur.

Research limitations. *As a first limitation, we acknowledge that this paper concentrates on a single sector. While the fashion industry provides valuable insights and serves as an excellent field for exploring the proposed themes, future research should aim to compare the results of this study with findings from other sectors. A second limitation is the dependence on a single case study. Although the case effectively illustrates the phenomenon under investigation, subsequent studies should conduct a cross-case analysis to yield more comprehensive findings. Finally, despite data being gathered from multiple sources, the qualitative interview was conducted only with the activist entrepreneur. It would be valuable to gather perspectives on the international dimensions of activist entrepreneurship from those who collaborate with activist entrepreneurs, including those within the company and those engaged in social movements.*

Managerial implications. *Our paper presents significant managerial implications. First, the study highlights the necessity for activist entrepreneurs to develop an outlook that goes beyond domestic borders, embracing an international perspective. Instead, these individuals should focus on building international relationships, thus inserting themselves into global networks. However, second, international visibility and reputation are crucial for the company to foster strategic partnerships that further the dedicated activist cause. Ultimately, the empirical findings of this study stress how activist entrepreneurs must consistently reassess and rethink their business models. Given that the enterprise also plays a practical role in supporting activist efforts, the company's activities must evolve significantly, especially in response to the advancement of the cause they champion. From this viewpoint, activist entrepreneurs need to exhibit a willingness to*

change while carefully evaluating potential risks. Indeed, a possible business failure would have serious consequences for the cause they support.

Originality of the paper. *The originality of this work lies in several aspects. First, it offers a comprehensive empirical examination of activist entrepreneurship, which needs further investigation within current scholarly discourse. Additionally, it delves into its international dimension. Indeed, while previous literature has emphasized the transnational nature of activism and limitless action (Monteverde et al., 2024), the internationalization of activist entrepreneurship has not been studied as a distinct component. Furthermore, this paper links activist entrepreneurship to internationalization, aiming to understand unconventional motivations compared to the traditional internationalization factors discussed in the existing literature.*

Key words: *activism; entrepreneurship; activist entrepreneurship; internationalization; fashion industry; case study*

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Outsidership/Insidership in international business: looking back and moving forward

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Abstract

Insidership and its opposite outsidership have been key concepts in international business research, since the revised Uppsala model in 2009, with studies exploring its definitions, effects, and implications. This review traces the development of key research areas on outsidership/insidership, with a focus on the latter: what is network insidership, how to become an insider, the liability of insidership, and how firms respond to the outsidership/insidership issues. The study advocates for a clearer conceptual framework for insidership, better integration of the liability and asset perspectives, and greater focus on the diverse strategies firms employ to navigate outsidership. It also encourages expanding research into underexplored areas such as digital transformation, and de-globalization.

Framing of the research. *The groundbreaking paper by Johanson and Vahlne (2009), which revisited the Uppsala model of internationalization published by the two authors in 1977, advanced the network perspective on internationalization by proposing that the primary challenge for internationalizing firms is not foreignness, but rather network outsidership. They argued that success in foreign markets hinges on firms developing an insidership position within key networks. This view has significantly influenced subsequent studies, which demonstrated that network insiders have access to valuable knowledge, identify new opportunities more effectively, and outperform outsider firms (Hilmersson & Jansson, 2012; Vahlne et al. 2012; Blankenburg Holm et al., 2015). Insidership has thus become widely regarded as an asset for firms pursuing internationalization, seen as essential for navigating foreign markets and achieving sustained growth (Li and Fleury, 2020).*

Johanson and Vahlne's (2009) updated Uppsala model highlights that firms operating as outsiders to established networks face heightened uncertainty and risk when entering foreign markets. These firms have limited knowledge of foreign environments and lack connections with key local stakeholders, such as partners, customers, and suppliers. The model posits that achieving insidership within a network is essential for successful internationalization, making the process of expansion largely about overcoming outsidership (Johanson & Vahlne, 2009). The liability of outsidership suggests that firms struggle to operate in unfamiliar networks due to their restricted understanding of local market dynamics. When entering a new geographic market, firms must expand their networks and strategically position themselves within new business ecosystems. This process involves transitioning from outsidership to insidership, a critical step for long-term success (Johanson & Vahlne, 2009; Hilmersson & Jansson, 2012). To secure an insider position, firms must align and integrate with the local business network, ensuring synchronization with its structures and practices (Johanson & Johanson, 2021). Synchronization occurs through modifications and adaptations, requiring firms to allocate resources to local conditions and invest in strengthening their network position. Hilmersson (2013) demonstrated that insidership in local networks is achieved once a firm establishes multiple relationships characterized by mutual commitment. Johanson and Johanson (2021) further argued that these relationships extend beyond business interactions to include social and institutional ties. As firms commit to these relationships, they become increasingly embedded within the network, solidifying their insidership position and enhancing their ability to operate effectively in foreign markets.

Firms can achieve insidership by initiating their first relationship with a partner in a foreign business network. As they strengthen existing ties or establish new ones within the same network, their level of insidership deepens (Hilmersson & Jansson, 2012). This concept emphasizes the critical role of relationship-building in successful internationalization. By fostering strong connections with local partners, customers, suppliers, and other key stakeholders, firms gain access to valuable resources, market intelligence, and supportive networks (Brouthers et al., 2022). These relationships not only build trust but also facilitate knowledge sharing, ultimately enhancing the firm's market position and performance (Almodovar & Rugman, 2015).

Purpose of the paper. *This review examines the evolution of key research areas related to insidership, including the meaning of network insidership, the process of becoming an insider, the challenges of insidership, and firms' strategic*

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responses to the outsidership/insidership dynamic. The study calls for a more refined conceptual framework for insidership, stronger integration of the liability and asset perspectives, and increased attention to the diverse strategies firms use to overcome outsidership. Additionally, it highlights the need to extend research into underexplored areas, such as digital transformation and de-globalization. In particular, the paper identifies possible future lines of research on the topic of insidership, which are considered particularly relevant in the current international context characterized by growing geopolitical tensions, where being an insider or outsider in certain markets could take on a new significance.

Methodology. *We conducted an in-depth examination of existing academic knowledge regarding the concept of insidership through a systematic literature review. This research approach involves a thorough analysis of published works, employing a rigorous and transparent methodology to synthesize the available data comprehensively (Paul and Criado, 2020), providing "collective insights through theoretical synthesis into the fields and sub-fields" (Tranfield et al., 2003, p. 220). Moreover, it delivers a comprehensive overview of the current state of research within the field and helps identify research gaps (Kraus et al., 2020, p. 1028). To conduct this systematic review, we adhered to the 3As model, which involves three key stages: assembly, arranging, and assessing existing literature, wherein "assembling refers to the identification and acquisition of literature, arranging pertains to the organization and purification of literature, and assessing relates to the evaluation and reporting of literature" (Paul et al., 2021, p. 2).*

Phase 1: assembling. To build our database, we retrieved articles in Scopus - the largest citation database of peer-reviewed literature - using a focused research query that included only:

- *Articles containing the words "insidership" (44 papers) or "outsidership" (129 papers): we followed a keyword approach to identify the articles, and the Scopus database was queried for keywords in the title, abstract, or keywords list - using this explicit mention as a proxy for the centrality of the topic to the paper. We decided to use the keyword "outsidership", despite insidership being the focus of this study, because we verified that the papers that deal with the liability of outsidership inevitably analyze aspects of insidership (for example, the strategies for acquiring an insider position in the foreign market, thus overcoming the liability).*
- *Journal articles: we focused on articles published in internationally renowned journals and excluded other publication outlets such as monographs, books, book chapters, conference proceedings, and commentary essays from the analysis. Journal quality was taken as an indicator of study quality (e.g. Guercini & Milanesi, 2020). Additionally, we focused on high-quality peer-reviewed academic outlets and excluded practitioner journals from further consideration (Schmeisser, 2013).*
- *Business, management, and accounting as subject area.*
- *Articles written in English.*

The final search to complete the database was performed in March 2025. From the keyword search we obtained a total of 173 publications net of duplications. The other filters (source and document type, subject area, and language) led to the identification of 96 articles. We did not include a time limit; however, we expected the articles to be no earlier than 2009, the year in which Johanson and Vahlne's paper was published which introduced the concept of liability of outsidership and, conversely, that of insidership.

Phase 2: arranging. The second step of the systematic literature review was arranging, which pertains to the organization and purification of the literature. The screening of the selected articles consisted of an eligibility stage based on journal relevance and content relevance. Regarding journal relevance, we selected journals that are rated at least in one of the two independent systems: ABS (Chartered Association of Business Schools academic journal guide 2024) and ABDC (Australian Business Dean's Council academic journal ranking 2022). This led to the exclusion of 6 journals and the related papers. As for content relevance. We screened the titles, the abstracts, and, when necessary, the content of each of the remaining 90 articles to decide whether they addressed our intended issue. In total, 9 articles were excluded as they did not meet the eligibility assessment of content relevance: the keywords were used either with a generic meaning or without these articles addressing the topic under study. The screening was conducted independently by the members of the research team, who reached a complete agreement on a final list of 81 articles, and some primary data (authors, year of publication, journal, abstract) were recorded in an Excel workbook.

Phase 3: assessing. The third step was assessing, namely the analysis and reporting of literature. We decided to analyze the papers both descriptively and thematically. The descriptive analysis was processed to classify, organize, and describe the sample of selected articles. In contrast, the thematic analysis was processed to investigate themes, conceptualizations, results, and research methods.

Results. *The review aims to organize the findings around several key themes. First and foremost, the definition and conceptualization of insidership. While the literature clearly establishes, starting from Johanson and Vahlne's 2009 contribution, a definition of outsidership as a liability in internationalization processes, the definition of insidership remains vague, with no significant attempts to further develop the concept.*

Secondly, most of the literature focuses on proposing possible strategies to overcome the liability of outsidership and, consequently, suggests how to establish an insider position in a foreign market. In this context, it is possible to identify a range of key actors that are crucial for foreign firms in establishing an insider position in a foreign market: (i) strategic alliances & partnerships: collaborating with local firms, suppliers, and distributors can facilitate knowledge transfer and legitimacy; (ii) industry associations & business groups: joining trade associations or participating in industry events can enhance credibility and access to critical resources; (iii) institutional connections: Engaging with government bodies and regulatory agencies helps firms navigate bureaucratic hurdles and gain legitimacy.

Thirdly, it is possible to distinguish between studies that analyze this topic in relation to multinational enterprises (MNEs) and small and medium-sized enterprises (SMEs), as well as those that examine the establishment of an insider position in mature versus emerging markets, or by firms originating from mature versus emerging economies.

Fourthly, it is interesting to note that most contributions view insidership as an asset, capable of providing numerous benefits to firms. However, especially in recent years, there have been contributions highlighting some of the challenges associated with insidership. For example, in his commentary on the revised Uppsala model, Forsgren (2016) took an entrepreneurial perspective and proposed the concept of a "liability of insidership" for firms that are deeply embedded within business networks. This perspective challenges the traditional view of insidership as a purely beneficial asset, highlighting the potential drawbacks and complexities of being tightly integrated into these networks. Due to mutual commitment and investments specific to the relationship, there is limited flexibility, making it costly for insiders to sever business ties. As investments become more relationship-specific, the transferability of resources decreases. Consequently, insiders may find themselves locked into the network they are part of, reducing their autonomy and flexibility. In summary, recent studies have highlighted the existence of a liability of insidership. However, this concept remains underdeveloped in the international business literature, with insights primarily drawn from research on network embeddedness. It is acknowledged that excessive dependence on a network can create vulnerability, especially during disruptions or economic downturns. Additionally, research suggests that the rigidity of information flow within tightly connected networks may impede adaptability and innovation, while the risk of groupthink can obstruct critical decision-making. The lack of diverse perspectives within a close-knit network may also hinder creative problem-solving. Given that firms embedded in networks are typically seen as adapting slowly to change, concerns about over-embeddedness are heightened during times of transformation. These insights emphasize the need for a more nuanced understanding of the potential downsides of insidership, particularly in dynamic and rapidly changing environments.

Finally, the current state of research on insidership seems to overlook some major trends, such as digitalization, and the dynamics at play in the global context. These include the significant uncertainty arising from geopolitical tensions, as well as more general phenomena like deglobalization and decoupling, which open up new international scenarios and could provide fresh impetus for research on insidership.

Research limitations. *The paper is still a work-in-progress, further research is needed to conduct an in-depth analysis of the selected papers.*

Managerial implications. *A deep understanding of insidership can undoubtedly provide managers with valuable tools to: (1) comprehend how to build and maintain an insider position in a foreign market, (2) identify key actors with whom to establish partnerships and long-term relationships, (3) recognize the potential drawbacks of insidership, and (4) develop strategies to reduce insidership when necessary, particularly in light of current tensions and shifts in the international business landscape.*

Originality of the paper. *While the international business literature has primarily focused on outsidership, particularly the liability of outsidership, the concept of insidership has often been taken for granted as merely its opposite. This paper aims to explore the meaning of insidership in greater depth. Furthermore, while insidership has traditionally been viewed as an asset, this study highlights its darker aspects, advocating for a more balanced perspective that considers both its benefits and drawbacks. Finally, the paper suggests that future research should incorporate the contextual conditions in which firms operate internationally, integrating major themes such as digitalization and deglobalization into the study of outsidership and insidership.*

Key words: *insidership, outsidership, international business, review.*

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Track 5
Management Case Studies

Digital healthcare platforms for engaging chronic patients: The case of ASL Caserta's Chronic Plus Platform

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Abstract

Managing chronic patients represents a complex challenge for advanced economies, where fragmented healthcare systems impede patient engagement, drive up costs, and lower compliance rates. This study examines how digital health platforms influence the engagement of chronic patients across different stages of the care process, presenting itself as a potential solution to the issue of lacking a continuous, patient-centered care pathway.

Using a case study approach, we investigate the CHS Chronic Plus Platform, a digital healthcare solution implemented by the ASL Caserta, recognized as one of Italy's most innovative platforms for chronic disease management. Data derived from 20 in-depth interviews with healthcare managers and professionals of the ASL Caserta were analyzed through thematic analysis. The findings reveal that the platform functions as a vital service touchpoint within healthcare operations, as its specific features enhance patient engagement across behavioral, emotional, and cognitive dimensions at every stage of the care pathway. This improvement leads to better healthcare access, greater adherence to treatment plans, and higher patient satisfaction.

These results pave the way for the broader adoption of digital platforms in the healthcare sector while providing a strong foundation for future studies on this topic, fostering greater interdisciplinarity between services marketing and health management in the digital domain.

Key words: *patient engagement; digital health platforms; care pathway; case study*

Framing of the research. *By 2030, it is estimated that 70% of the global burden of diseases will be due to chronic conditions such as heart disease, diabetes and cancer (WHO, 2020). The rise in chronic patients, exacerbated by the aging population, make the design of healthcare services more complex and demands improved continuity of care because long-term health conditions impact not only the physical but also the cognitive, social, and emotional aspects of a patient's life (Vansimaeys et al., 2021).*

Progress in addressing these challenges is hampered by the intricate nature of healthcare systems, which involve multiple stakeholders and have a multilayered structure (Carlini et al., 2024), and by the lack of a continuous, patient-centered care pathway (Rocco et al., 2024). This fragmentation adversely affects patient compliance and increases the financial burden of managing these diseases on national budgets. For instance, in 2020, healthcare expenditure in the USA amounted to 18.82% of GDP, and this figure is expected to grow (The World Bank, 2023).

In this setting, digital health can offer innovative solutions to improve patient health and the efficiency of healthcare organizations. Digital health encompasses a variety of solutions that, delivered through technologies like 5G, blockchain, Internet of Things and Artificial Intelligence, serve different contexts, health aims, and users, including patients and providers (Chaturvedi, et al., 2025). From a patient's perspective, digital health technologies mainly include online platforms and mobile and wearable devices (Šmahel et al., 2018).

Digital healthcare platforms primarily function as transaction platforms, connecting patients with medical professionals. Additionally, they integrate aspects of innovation platforms, linking various complementary services and technologies utilized by diverse healthcare providers, including traditional public primary care organizations. Some

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healthcare platform firms, like the 24Health group in Europe, embrace these dual perspectives by separating their transaction platform operations from their technological innovation platform activities (Björkdahl et al., 2024).

Platforms facilitate digital matching between patients and medical professionals and incorporate platform technologies, data analytics, telemedicine, and electronic health records to improve various facets of healthcare. Although digital platforms are often regarded as catalysts for new ecosystems, in the healthcare sector they are integrated into existing systems (i.e., platform grafting) since healthcare services are rigorously regulated, and digital services cannot entirely replace in-person consultations and treatments but must often be supplemented with physical care (Björkdahl et al., 2024).

The advantages of healthcare digitalization are substantial: they improve the speed and quality of services, seamlessly connect patients with medical professionals, and facilitate access to complementary services. For healthcare providers, these platforms reduce the need for expensive physical facilities, simplify the matching and communication between patients, doctors, and nurses, and balance demand across different regions. For patients, digital platforms offer the convenience of accessing healthcare without traveling to distant centres and spending hours in waiting rooms with other potentially contagious patients (Björkdahl et al., 2024).

Purpose of the paper. *Recent advancements in digital healthcare have transformed the nature and significance of patient engagement (Kickbusch et al., 2021). It is understood as a management approach that, by promoting health education and health-friendly behaviors, equips individuals with essential tools to make better decisions for their well-being, thereby reducing cultural and social inequalities (Ippolito et al., 2020). Empowerment has multifaceted effects on patients, granting them greater rights and responsibilities in healthcare decisions. This poses a challenge for providers due to information asymmetries, patients' limited interest in the economic impact of care, and their reluctance to participate since perceived as an obligation (Berry and Bendapudi, 2007). Moreover, empowerment shifts the focus from illness to overall well-being, including physical, psychological, and existential dimensions (Engström and Elg, 2015). Empowerment also plays a critical role in healthcare policy, promoting patient-centered care and improving outcomes (Chen et al., 2013).*

Digital tools enabling patients to engage with their health data are increasingly integrated into digital systems, creating a direct link between access to these systems and a patient's ability to engage (European Patients' Forum, 2017). Patient engagement with their health data covers both patient access to and active utilisation of their health data during healthcare trajectories (van Kessel et al., 2024), including prevention, diagnosis, care and rehabilitation.

Within the realm of healthcare digital platforms, Patient Engagement Platforms (PEPs) stand out as digital health applications designed to automate patient outreach and maintain engagement throughout their care journey (Campbell et al., 2020). These platforms encompass patient portals, mobile apps, and messaging chatbots, which can be accessed via smartphones, tablets, or computers. PEPs can undertake tasks typically performed by clinicians, such as delivering educational content, sending treatment reminders, reporting pain scores, and managing health outcomes. They enhance patient experience and satisfaction by fostering a sense of connection and care. PEPs also provide significant benefits to physicians by improving referral processes, expanding their practice, boosting care team efficiency, and automating data collection. They can generate revenue through Remote Patient Monitoring and help practices earn full credit for Improvement Activities under the Merit-based Incentive Payment System. The primary advantage of PEPs lies in their ability to enhance patient outcomes and reduce healthcare costs. Research shows they can shorten hospital stays, reduce postoperative emergency room visits, lower readmission rates, and decrease clinic visits. Additionally, PEPs reduce the need for therapy and home care services, increase patient satisfaction, and decrease the volume of patient-initiated calls to healthcare offices.

The predominance of healthcare and nursing literature addressing the PEPs highlights a significant current gap in empirical research within the field of management (Ippolito et al., 2020). Thus, an essential trajectory for future research is the deeper exploration of patient engagement issues in remote consultation through digital tools (Liu et al., 2024). Another significant shortcoming is the lack of integration in care pathways, resulting in fragmented care that fails to ensure continuous, patient-centered care for chronic patients. Rocco et al. (2024) assert that the implementation of diagnostic-therapeutic assistance pathways is incomplete, preventing a unified model for managing patients with chronic diseases. Additionally, managing multidisciplinary clinical cases is challenging due to the absence of a holistic approach, and there is a lack of comprehensive, real-time shared health information for the patient (Filippini and Vinceti, 2021).

Building on these research gaps, the paper aims to explore the role of digital technologies in patient interaction with healthcare services, from prevention and diagnosis to treatment and follow-up. Particularly the research question addressed is: How do the digital health platforms affect the patient engagement along the different stages of the care pathway?

To address this research question, patient engagement is conceptualized as comprising multiple dimensions that capture the spectrum of patient behaviors and attitudes toward healthcare, including behavioral, emotional, and cognitive aspects (Liu et al., 2024). Specifically, the behavioral dimension pertains to a user's actions related to participation and transactions; the emotional dimension focuses on the user's experiences and feelings; while the cognitive dimension encompasses the user's beliefs and knowledge about the system or service (Vargo and Lusch, 2016).

Drawing on Lemon and Verhoef (2016), we designed the care pathway to mirror a customer's interaction with a firm, categorizing it into three distinct stages: the prepurchase phase aligns with the period before receiving healthcare services, the purchase phase corresponds to during the service experience, and the postpurchase phase reflects the period following the service.

Methodology. *The study utilizes case study methodology (Yin, 2003) to comprehensively analyze and describe the phenomenon under investigation, while also laying a foundation for future research. This approach is particularly suited for exploring complex issues where forming hypotheses beforehand is challenging, and it effectively addresses 'how' research questions (George and Bennett, 2005). Using a non-probabilistic technique (Newman, 2000) and choosing a purposing case, CHS Chronic Plus Platform was selected, because it is considered by the Ministry of Health among the best innovative experiences for managing chronic conditions in Italy (https://www.piattaformacronicita.salute.gov.it). CHS also stands out for having been implemented by a Local Health Authority, the ASL Caserta: health organizations, in fact, do not always embrace new healthcare technologies with enthusiasm (Bronsoler et al., 2020; Owusu et al., 2021), especially when their adoption entails changes in organizational routines and high initial costs to be sustained (De Domenico et al., 2023). Nonetheless, many healthcare organizations lag behind in digital transformation, failing to align with customer expectations (Anderson et al., 2019). Research also indicates that IT system infrastructures in the healthcare sector remain comparatively underdeveloped when measured against other industries (Ricciardi and Tarricone, 2021).*

Data collection, conducted between November 2024 and January 2025, included 20 in-depth, online interviews with managers, medical and non-medical staff. Each interview, lasting approximately 50 minutes, was structured around open-ended questions divided into two sections. The first section examined the platform's structure and overall functionalities, while the second delved into the dimensions of patient engagement facilitated by the platform at different stages of the care pathway. The interviews were recorded and transcribed verbatim. Secondary data sources, including the corporate website, business documents, and media reports, were also utilized to enhance triangulation.

The data were analysed using thematic analysis, to identify patterns in transcribed conversations through quotes or paraphrased ideas (Braun and Clarke, 2019). The collected data were organized into coherent categories - such as platform characteristics, patient engagement, and stages of the care pathway - to enhance the research's overall reliability (Yin, 2015). Initially, data were reviewed individually and then compared to uncover similarities and differences while avoiding subjective interpretation.

Results. *Preliminary findings have emerged from the ongoing data analysis. The platform's design seamlessly combines technological tools with healthcare services, creating a system that prioritizes patients and their needs throughout the entire care pathway. Each stage of the remote consultation process may exhibit different manifestations of engagement across the dimensions of behaviour, emotion, and cognition, which are divided and presented in the table below (Tab. 1). This reveals that the platform acts as a critical service touchpoint within healthcare operations.*

Tab. 1: The outcome of the CHS Chronic Plus Platform on the patient engagement along the care pathway

Patient engagement	***Platform functionalities***	***Outcome along the care pathway***		
		Before	***During***	***After***
Behavioural	o *personalized health plans* o *reminders for appointments and follow-ups* o *medication schedules*	*Enhancement of the degree to which patients take the initiative to participate in the service*	*Increase in the depth and frequency of the interaction between patient and clinician*	*Stronger patient adherence to prescribed health or medication plans*
Emotional	o *user-friendly design with intuitive interfaces* o *educational resources and support services* o *virtual consultation and telemonitoring* o *electronic health records*	*Mitigation of skepticism towards new modes of health service*	*Reliability in attending future sessions*	*Increase in satisfaction with the health service experience*
Cognitive	o *track personal health data* o *access to detailed clinical reports* o *insights into their medical conditions*	*Recognition of the digital tool as an efficient alternative for providing and accessing healthcare services*	*Development of a comprehensive understanding of the process of health service experience, including its advantages and disadvantages*	*Opportunity to learn from their medical condition*

Source: our elaboration

Before the care pathway begins, behavioral engagement is fostered through personalized health plans that inspire patients to take a proactive role in their care journey. By leveraging population stratification techniques, the platform identifies at-risk patients who require closer monitoring and support. Emotional engagement is enhanced through user-friendly interfaces and comprehensive educational resources, alleviating skepticism and building trust in digital healthcare solutions. Beyond educational initiatives, the platform also offers psychological assistance to encourage patients to actively manage their health. These services aim not only to improve clinical outcomes but also to enhance patients' quality of life while reducing unnecessary reliance on emergency and hospital services. Cognitively, patients are empowered with seamless access to detailed clinical reports and valuable insights, enabling them to better understand the potential of digital tools in analysing and managing their medical conditions.

During treatment, behavioral engagement is maintained through appointment reminders and follow-up notifications, ensuring consistency in patient participation. Furthermore, the platform supports electronic prescriptions and

appointment scheduling, effectively reducing administrative burdens and boosting overall system efficiency. Emotional engagement is strengthened by telemonitoring and virtual consultations, which cultivate trust and reliability in attending sessions. The integration of telemedicine tools minimizes the need for in-person visits while providing continuous oversight of clinical parameters - essential for managing chronic illnesses. Additionally, the platform's digital report delivery system ensures that patients receive their test results quickly and conveniently. Moreover, real-time health data tracking allows patients to feel more involved and in control of their treatment process, further enhancing cognitive engagement.

After the care pathway, adherence to prescribed medication schedules and follow-up plans sustains behavioral engagement. Emotional engagement is deepened as patients continue to feel supported through ongoing access to the health record system, which allows for centralized collection and management of patient data. This ensures healthcare providers have immediate and comprehensive access to patient information, enhancing decision-making and care coordination. At the cognitive level, patients gain a deeper understanding of their health conditions, reinforcing the value of digital tools in managing long-term care and fostering sustained involvement in their health journey.

In summary, CHS Chronic Plus is far more than a technological innovation; it is an integrated healthcare ecosystem that strengthens the local healthcare system. It improves operational efficiency as well as diagnostic accuracy and ensures that care remains patient-centered, providing more well-rounded treatment options and overall health outcomes. Moreover, CHS Chronic Plus seamlessly integrates with existing physical systems, including Chronic Care Centers, which are healthcare facilities where a multidisciplinary team of professionals, such as physicians, nurses, and specialists, collaborates to deliver personalized, high-quality care tailored to individual patient needs. Finally, the platform serves as a crucial resource not only for patients with chronic conditions but also for medical staff, as CHS Chronic Plus has proven to enhance efficiency and effectiveness, particularly in redesigning care protocols, clinical processes, and the documents generated by clinical and administrative activities.

Research limitations. *The study is not without limitations, which present valuable avenues for future exploration. The most significant constraint is the absence of the patient's perspective, a critical factor in evaluating the platform's effectiveness in fostering engagement. As emphasized in the literature, a patient's circumstances and characteristics - such as living in rural areas, age, or level of technological literacy - play a pivotal role in shaping remote consultations (Liu et al., 2024). These elements become especially important in the context of the Caserta province, where more than 40% of the population is 50 or older and 70% of them live in rural towns with less than 10.000 inhabitants (ISTAT, 2024). Thus, future research should focus on conducting interviews with chronic patients and their caregivers, ensuring their perspectives are more comprehensively integrated.*

Moreover, our focus is exclusively on the positive aspects of chronic patient engagement enabled by the CHS Chronic Plus Platform, whereas future studies should also address the challenges associated with the use of digital technologies in healthcare, such as data security and privacy risks.

Another notable limitation of this study is that its findings are derived from a single case study, which limits their applicability to broader contexts. Future research could expand on these insights by undertaking additional case studies that explore diverse innovative approaches to managing chronic conditions, as well as differing institutional frameworks beyond the Italian setting.

Managerial implications. *Though still preliminary, our findings hold significant implications for public health sector managers. Patient engagement requires to be considered both an ethical and practical priority for ensuring the long-term sustainability of the National Health Service (NHS). Ethically, it underscores a commitment to recognizing patients as active participants in their healthcare journeys, valuing their contributions, and enhancing their autonomy. Practically, patient engagement aids in optimizing healthcare resources by promoting better adherence to treatment plans, improving health outcomes, and minimizing avoidable hospitalizations. By empowering patients and involving them in care processes through platforms like CHS Chronic Plus, healthcare systems can foster trust, encourage preventive care, and adapt more effectively to the evolving challenges of managing chronic diseases. Such an approach is essential for establishing a resilient and sustainable healthcare system, where e-health solutions and territorial health units, such as the ASL, work in unison as an integrated network to manage patients, particularly those who are frail or living with one or more chronic conditions (Bitar and Alismail, 2021). The CHS Chronic Plus Platform stands out as a scalable best practice within the Italian healthcare landscape, addressing inefficiencies caused by the lack of a strategic direction, which hampers patient care and increases healthcare costs (Ferraresi et al., 2021).*

Originality of the paper. *This paper contributes to the growing body of research on digital healthcare by offering a novel perspective that integrates patient engagement with healthcare management and digital transformation. Unlike previous studies, which predominantly focus on clinical or nursing aspects, this research adopts a managerial viewpoint, addressing the strategic and operational implications of digital platforms in chronic disease management.*

A key originality of the study lies in its interdisciplinary approach, bridging the literature on services marketing and health management. While patient engagement has been widely discussed in healthcare research, it has often been examined from the provider or policy perspective (Agarwal et al., 2020) rather than through a structured analysis of engagement dynamics across the entire care pathway. By conceptualizing patient engagement through behavioral, emotional, and cognitive dimensions and mapping these onto different stages of care (before, during, and after treatment), this paper adopts a comprehensive framework for understanding engagement in digital healthcare contexts.

From an empirical standpoint, this study focuses on a public healthcare initiative - the CHS Chronic Plus Platform - rather than private-sector digital health solutions, which have traditionally dominated research in this field. By examining

a platform implemented by a Local Health Authority (ASL Caserta), this paper sheds light on the opportunities of digital transformation within publicly funded healthcare systems, where adoption barriers and institutional constraints are often more pronounced.

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Integrating corporate industrial heritage, digital transformation, and social sustainability: the "Dublo Fashion Heritage project"

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Abstract

This study examines the role of corporate industrial heritage in strengthening territorial identity and promoting sustainability by integrating corporate memory, innovation, and community engagement. Through the Dublo Fashion Heritage project, it explores how heritage preservation fosters connections between businesses, local communities, and sustainable development. Using a multi-stakeholder approach and the Delphi method, the research highlights the significance of digital transformation in preserving corporate heritage, enhancing social sustainability, and reinforcing territorial identity. Findings demonstrate that digital archives and innovative storytelling can turn industrial heritage into a dynamic asset for cultural and economic development, providing actionable insights for organizations and policymakers seeking to align heritage conservation with contemporary sustainability objectives.

Framing of the research. *Corporate industrial heritage represents the enduring attributes and qualities that define an organization's identity, linking its past, present, and future in ways that resonate with both internal and external stakeholders (Balmer, 2011; Burghausen, 2024). This heritage extends beyond the corporation itself, influencing the surrounding territories, communities, and cultural narratives, becoming a critical asset for corporate identity and communication (Spielmann et at., 2021: Montella, 2024). The geographical rootedness of corporate heritage in specific locations contributes to a distinct sense of identity for organizations and their communities, fostering mutual enrichment over time (Balmer, 2013; Balmer and Burghausen, 2015). Furthermore, companies often leverage corporate heritage as an intangible asset to enhance brand value, strengthen stakeholder relationships, and gain a competitive advantage (Al-Amad et al., 2024; Montella, 2024).*

The integration of corporate industrial heritage with contemporary advancements plays a crucial role in territorial development and sustainability. Heritage conservation initiatives often align with corporate social responsibility strategies, recognizing the cultural significance of industrial and historical roots in shaping organizational identity and enhancing the vitality of local communities (Mohanty et al., 2024; Lueg, 2023). For industrial heritage to contribute effectively to sustainability, it must not only preserve historical and cultural values but also promote innovation that builds on these foundations (Pironti et al., 2016). Digital technologies have emerged as transformative tools in this regard, enabling the documentation, management, and cultural promotion of industrial heritage while making it accessible to broader audiences (Pardo Abad, 2019; Chatzi Rodopoulou, 2023). By digitizing tangible and intangible heritage elements, companies can bridge the past with the future, repurposing historical assets for education, tourism, and economic development.

Social sustainability is inherently tied to corporate industrial heritage, as both emphasize the importance of fostering well-being, strengthening social relationships, and engaging communities. Social sustainability prioritizes equity, participation, and inclusion, and it is closely linked to the sense of place-defined as the emotional and cultural bonds individuals form with their environment (Dempsey et al., 2011; Relph, 1976). Community engagement, as a cornerstone of social sustainability, is essential for fostering collective identity, building trust, and ensuring the long-term resilience of communities (Stevenson, 2021; Fredline et al., 2003). These social dynamics are particularly important in the context of industrial heritage, as the preservation and reinterpretation of corporate memory can strengthen territorial identity, foster community pride, and generate opportunities for cultural and economic development (Scaffidi et al., 2025).

Innovation serves as a bridge between corporate industrial heritage and social sustainability, driving both territorial and organizational progress. Social innovation involves implementing new solutions to improve the well-being of individuals and communities (Zahra et al., 2009) and respond to currently unmet social needs (Phills et al., 2008). For industrial heritage, this can take the form of digital transformation, innovative cultural programming, or regeneration

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projects that combine heritage preservation with social and economic renewal (Scaffidi, 2024; Pardo Abad, 2019; Chatzi Rodopoulou, 2023). The creation of digital archives is also a valuable tool for preserving corporate history. Corporate archives serve as repositories of traditions, stories, and values associated with companies and their products. They embody the cultural capital of a brand, reflecting its evolution and significance within the broader cultural context (Vacca, 2024; Chatzi Rodopoulou, 2023). By fostering innovation and adapting to changing environments, corporations can sustain their success while contributing to the vitality and resilience of the regions in which they operate (Sammour et al., 2020; Pironti et al., 2016).

In summary, corporate industrial heritage, social sustainability, and innovation are deeply interconnected. Together, they can enable organizations to preserve their legacy, engage stakeholders, and foster sustainable development that benefits both businesses and communities.

This is particularly relevant in the fashion industry, where brands must balance artisanal craftsmanship and tradition with the demands of digitalization and sustainability (Zacheo et al., 2024). Fashion archives often document techniques and craftsmanship that are no longer widely practiced. By maintaining these digital records, brands can preserve and promote traditional skills, ensuring that valuable expertise is passed down to future generations. These archives evolve from mere custodians of the past into active contributors to a brand's ongoing narrative and identity (Vacca, 2024). Moreover, the fashion industry faces challenges such as resource depletion and globalization, and the preservation of cultural heritage can play a significant role in maintaining identity and promoting sustainable practices within the fashion system (Brown and Vacca, 2022)

Purpose of the paper. *This research uses the Dublo Fashion Heritage project as a case study to explore the role of industrial cultural heritage in enhancing territorial identity and promoting sustainability, integrating corporate memory, innovation, and community engagement. The Dublo Fashion Heritage project focuses on the cataloging and valorization of the historical archive of Dublo Srl, an Italian textile company founded in 1937. The project aims to preserve and promote the company's industrial and cultural heritage by organizing its extensive archive of hosiery samples and historical documents. This initiative involves the development of a digital catalog system, making the archive accessible for research, education, and cultural promotion. Additionally, the project emphasizes community engagement by collaborating with students, local institutions, and strategic partners to highlight the company's historical ties to the region. It seeks to integrate heritage conservation with innovation by creating digital tools and fostering creative storytelling through multimedia formats such as short films and interviews. The overarching goal is to strengthen Dublo's brand identity, enhance its relationship with the territory, and contribute to the collective memory and cultural development of the region.*

While corporate industrial heritage has been extensively studied as an intangible asset contributing to organizational identity, branding, and competitive advantage (Balmer, 2011; Montella, 2024), its broader potential to enhance territorial identity, foster social sustainability, and digital transition remain underexplored. Existing literature acknowledges the role of heritage conservation in corporate social responsibility strategies and territorial development (Mohanty et al., 2024; Pironti et al., 2016; Scaffidi, 2024); however, there is limited empirical research on how industrial heritage can simultaneously integrate corporate memory, community engagement, and innovation to create sustainable and resilient local ecosystems. Furthermore, although digitization has been identified as a promising avenue for heritage promotion and management (Pardo Abad, 2019; Chatzi Rodopoulou, 2023), there is a lack of comprehensive frameworks for leveraging digital tools to bridge industrial heritage with contemporary sustainability practices and stakeholder participation.

This research addresses these gaps by using the Dublo Fashion Heritage project as a case study to examine the intersection of corporate industrial heritage, social sustainability, and innovation. Specifically, the study aims to:

1. *Identify effective strategies for conserving and valorizing industrial heritage and corporate memory.*
2. *Explore how corporate heritage initiatives can strengthen territorial identity and the sense of place.*
3. *Evaluate the role of community engagement in fostering social sustainability through industrial heritage projects.*
4. *Investigate the integration of digital tools and innovation in promoting corporate heritage and achieving sustainable development goals.*

By addressing these objectives, this research seeks to contribute to the growing discourse on the multidimensional value of industrial heritage and propose actionable insights for organizations and policymakers aiming to align corporate heritage initiatives with social sustainability.

Methodology. *The study employed the Delphi method, a well-established qualitative research approach aimed at achieving expert consensus on complex topics where knowledge may be fragmented or incomplete (Ametepey and Aigbavboa, 2019; Huang et al., 2019). Studies show that this approach is useful for (i) getting experts from different regions to agree on a specific topic (Imang and Ngah, 2012) and (ii) reaching consensus on a complicated issue from experts in fields with limited knowledge (Hauck et al., 2007). The methodology was selected due to its iterative nature, allowing experts to reflect on their responses and progressively refine their opinions, thus enhancing the reliability of the findings (Tseng et al., 2023; Sourani and Sohail, 2015) and it has been widely applied in sustainability research, particularly in industrial and urban heritage projects, where diverse stakeholder insights contribute to holistic governance models (Meijering et al., 2018; Rasouli et al., 2009; Chatterjee and Rose, 2012).*

Data Collection and Sample

Data collection was carried out in three iterative rounds. The Delphi panel was composed of a purposive sample of eight individuals representing different stakeholder categories reflecting a broad spectrum of interests in industrial heritage, sustainability, and territorial identity. Rather than being limited to disciplinary key-stakeholders, the panel included:

- *Public sector representatives (municipal and regional policymakers, cultural heritage officers)*
- *Business leaders and industry experts (managers from historical brands, sustainability officers, representatives of business associations)*
- *Academics and researchers (scholars specializing in industrial heritage, sustainability, and governance models)*
- *Cultural organizations and NGOs (heritage foundations, tourism development agencies, industrial heritage advocacy groups)*
- *Local community members (citizens actively involved in preservation efforts, neighborhood committees, student representatives)*

The selected stakeholders were from near geographic locations in order to evaluate how local citizens perceived the value of a historical brand in terms of sustainability (Shukor and Ng, 2022). The inclusion of university students aimed to capture the perceptions and expectations of younger generations, particularly concerning the educational, cultural, and professional value of industrial heritage. This approach enabled a more inclusive assessment of how historic corporate assets are perceived and valorized within the broader regional ecosystem (Yoopetch et al., 2022).

This stakeholder composition ensured the collection of heterogeneous yet complementary insights, supporting the identification of convergences and divergences across institutional, professional, academic, and civic perspectives.

Data analysis

The Delphi method facilitated the progressive refinement of expert opinions through iterative rounds, enabling participants to reassess their responses based on group feedback (Zharta et al., 2019). This structured approach mitigated individual biases and ensured a balanced representation of stakeholder perspectives. By integrating expert consensus with structured dialogue, the process enhanced the validity and reliability of the findings, offering a comprehensive framework for understanding stakeholder perceptions of sustainable industrial heritage (Musa et al., 2015).

By structuring insights from expert opinions, Content Analysis clarifies the interconnections between corporate memory, digital transformation, and social sustainability, contributing to a replicable model for the valorization of industrial heritage.

The analytical process consists of:

- *Transcription and anonymization of expert responses to ensure reliability and comparability.*
- *Identifying key concepts and patterns.*
- *Analysis of convergence and divergence to highlight interdisciplinary perspectives.*
- *Triangulation with literature and secondary data to validate findings and formulate strategic recommendations.*

Validity and reliability

The validity and reliability of the research model are undergoing continuous refinement, as the study remains in progress. The adoption of the Delphi Method ensures methodological rigor (Belton et al., 2019) by progressively refining expert judgments through iterative rounds, thereby mitigating potential biases and enhancing the credibility of the findings. Nonetheless, as the research advances, additional verification measures are being implemented to further strengthen the reliability of the Content Analysis approach.

Results. *The key-stakeholders interviews conducted offer a comprehensive perspective on the relationship between corporate industrial heritage, sustainability, and territorial identity. By analyzing their responses, key themes emerge shedding light on the strategies that businesses can adopt to integrate heritage conservation with innovation, digital transformation, and social sustainability.*

Preserving and enhancing industrial heritage: key strategies

A central theme emerging from the interviews is the pivotal role of digitalization in preserving corporate memory. The selected stakeholders unanimously acknowledge that tools such as digital archives, virtual museums, and interactive platforms enhance accessibility while safeguarding industrial heritage for future generations. As one interviewee noted, "Digitalization plays a fundamental role in the conservation and valorization of corporate heritage, making it accessible to a broader audience. However, they emphasize that digital tools should complement, rather than replace, direct engagement with historical artifacts and industrial sites (Cimadomo and Varagnoli, 2023).

Furthermore, the integration of circular economy principles into industrial heritage management is highlighted as a crucial strategy. In industries such as fashion, the revival of traditional production techniques and the use of sustainable materials provide pathways to maintaining continuity with historical craftsmanship while reducing environmental impact (Beltramo et al., 2021). This aligns with insights from the interviews, where sustainability is framed as inseparable from quality and durability: "Sustainability in manufacturing enterprises aligns with care and attention towards high-quality and durable products". Research further underscores the importance of preserving expertise and craftsmanship skills,

which are often deeply embedded within local communities and constitute a competitive advantage for businesses while reinforcing cultural sustainability (Bellia et al., 2022).

From a governance perspective, interview findings highlight that a participatory, multi-stakeholder model is essential for the sustainable management of industrial heritage. As one respondent emphasized, "The most effective approach is a collaborative and multi-stakeholder one, involving both public and private actors in the management of industrial heritage". Engaging businesses, public institutions, academia, and local communities ensures a shared approach to conservation, transforming corporate heritage from a mere business asset into a collective cultural resource with positive territorial impacts (Duglio et al., 2019).

Corporate heritage as a pillar of territorial identity

"Corporate heritage plays a crucial role in narrating the industrial and cultural history of a region, reinforcing local identity": the strong connection between corporate heritage and territorial identity is a recurring theme in the interviews. Many stakeholders emphasize the role of historic businesses in shaping collective memory, as they function not only as economic drivers but also as custodians of traditions and expertise that define local cultural identity (Maspoli, 2024). In this regard, corporate museums, heritage trails, and storytelling initiatives serve as effective instruments for communicating the historical significance of industrial heritage, fostering a sense of place, and reinforcing social cohesion (Alavi et al., 2024). Moreover, industrial heritage is increasingly regarded as a catalyst for urban regeneration, with the adaptive reuse of decommissioned industrial sites into cultural hubs, educational spaces, or innovation centers offering opportunities to preserve their historical significance while attracting investment and stimulating the growth of creative industries (Coscia et al., 2024).

Community engagement and social sustainability

The integration of corporate heritage into community engagement strategies is another prominent theme emerging from the interviews. Stakeholders agree that heritage conservation should not be an isolated effort but rather a collaborative process actively involving local communities. As one interviewee emphasized, "Businesses can promote thematic festivals, educational programs, and co-creation projects that encourage active citizen participation in heritage conservation". Initiatives such as open factory days, heritage festivals, and digital storytelling projects are identified as effective means of increasing public interest in industrial heritage, fostering a sense of belonging, and encouraging active participation (Li et al., 2021). The intergenerational transfer of skills and knowledge is another fundamental aspect. According to key-stakeholders, structured mentorship programs, educational workshops, and collaborations between industry and universities are key to ensuring that traditional manufacturing expertise is transmitted to new generations (Tseng et al., 2022). This aligns with insights from the interviews, where one respondent noted, "The tradition of industrial craftsmanship is deeply linked to the transmission of knowledge. Establishing training programs in collaboration with schools and universities ensures the continuity of specialized skills". Investing in vocational training programs can contribute to building a resilient workforce and strengthening local professional capacities. Furthermore, industrial heritage is increasingly being integrated into regional tourism strategies. The rising interest in industrial tourism, encompassing corporate museums, factory tours, and interactive exhibitions, creates opportunities for leveraging corporate heritage as an economic and cultural asset (Liu et al., 2018).

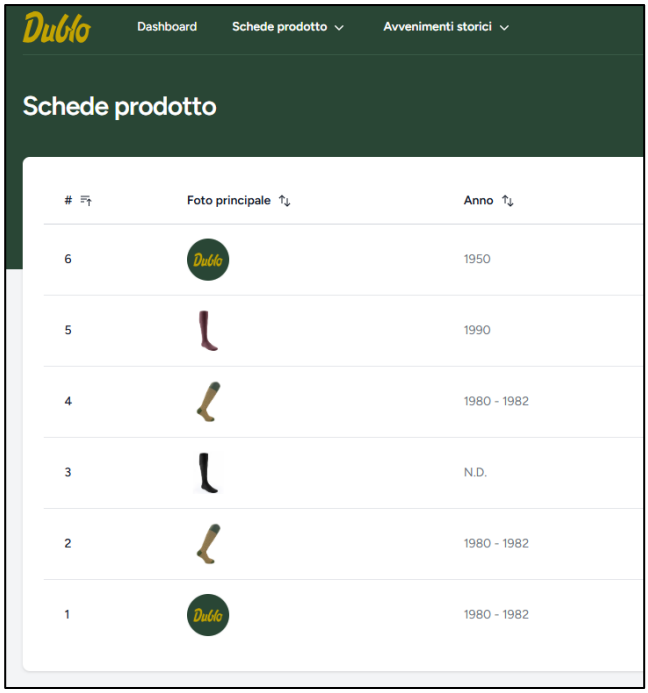
Digital innovation as a catalyst for heritage promotion

One of the most transformative aspects emerging from the interviews is the role of digital technologies in managing and promoting industrial heritage. Digital archives are considered essential tools for improving accessibility and facilitating the dissemination of historical documentation. Some stakeholders also propose leveraging blockchain technology to enhance the security and traceability of heritage records, thereby preserving their authenticity over time (Tseng et al., 2022). Augmented reality (AR) and virtual reality (VR) are also reshaping the way industrial heritage is experienced, allowing for immersive interactions with corporate history. Virtual reconstructions of historic factories and interactive museum exhibits provide engaging experiences for diverse audiences. However, stakeholders caution that excessive reliance on digital tools could undermine the authenticity of industrial heritage experiences, stressing the importance of balancing innovation with tradition (Li et al., 2021). Digital transformation extends beyond conservation, fostering environmental sustainability through automated archival processes, resource optimization, and waste reduction. The study underscores corporate industrial heritage as a strategic asset for sustainability, urban regeneration, and economic development. Its preservation and transmission rely on community engagement, digitalization, and circular economy strategies.

A key example is the Dublo Heritage digital archive, a platform that organizes technical sheets of all Dublo products, ensuring accessibility for research, education, and cultural promotion, providing a publicly accessible historical archive available on the web (see Figure 1). The development of the archiving system considered the practices used within the company, suggestions from workers, the needs of researchers in the fashion industry, and the ministerial codes for archiving, ensuring that all material becomes open data and is accessible in real time. Each technical sheet includes detailed information such as the year of production, line and season, and an interactive photo gallery. This collaborative approach enables not only to transmit heritage to future generations, but also to strengthen community engagement. The technical sheet of each product also displays significant historical events, selected based on the year of production, to provide historical and cultural context, and in this sense the digital archive also contributes to reinforcing territorial

identity. As mentioned by the interviewees, "Dublo Heritage aims to be the bridge between the past and the future, between archiving and digitalization, for a present that is always aware of the company's value".

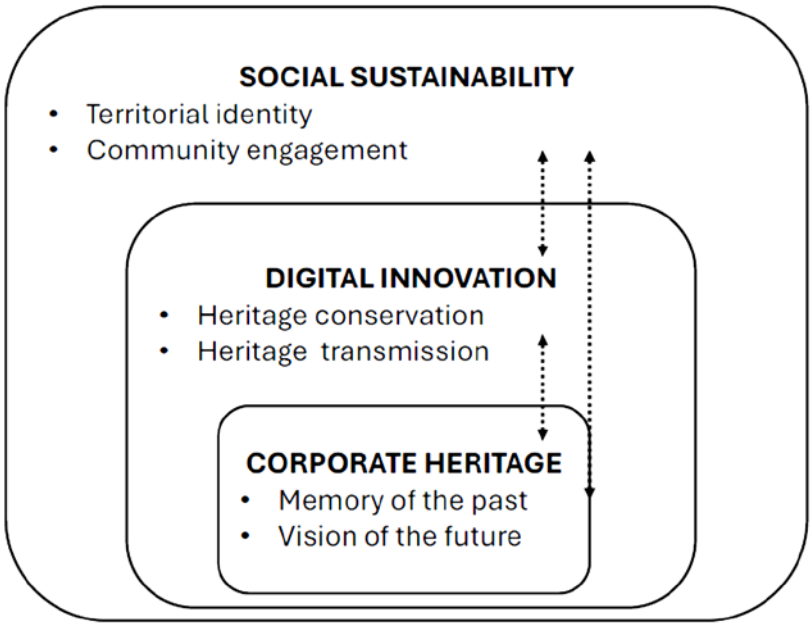
Fig. 1: Dublo Heritage digital archive



Source: https://dubloheritage.it/admin/prodotti

The preliminary findings of this research, therefore, enable the development of a model for good practice in corporate heritage management, leveraging innovation and social sustainability (see Figure 2).

Figure 2. A model for integrating corporate industrial heritage, digital transformation, and social sustainability



Source: authors' elaboration

Research limitations. *This study offers valuable insights into the role of corporate industrial heritage in sustainability and innovation, but it presents certain limitations. The findings are based on a single case study, Dublo Srl, limiting their generalizability to other industries and cultural contexts (Balmer, 2013; Scaffidi, 2024). Additionally, the Delphi method,*

while effective for key-stakeholders consensus, relies on subjective insights rather than quantitative data, which may introduce bias (Hauck et al., 2007; Ametepey and Aigbavboa, 2019).

The research primarily considers corporate-led heritage strategies, overlooking grassroots initiatives and non-corporate actors that may play a crucial role in heritage-driven innovation (Spielmann et al., 2021; Mohanty et al., 2024). Furthermore, while digitalization is a key theme, the study does not fully address technological challenges such as data ownership, preservation, and accessibility (Pardo Abad, 2019; Chatzi Rodopoulou, 2023).

Despite these limitations, the study provides a solid foundation for future research. Expanding sectoral comparisons, integrating quantitative analysis, and exploring the broader socio-economic impacts of industrial heritage would enhance the robustness and applicability of the findings.

Managerial implications. *The Dublo Fashion Heritage project provides actionable insights for managers and policymakers aiming to leverage industrial heritage for sustainable development. A key implication is the importance of digital transformation, particularly through the creation of digital archives. By investing in digital tools, companies can preserve and promote their heritage, making it accessible for education, research, and cultural tourism (Pardo Abad, 2019; Chatzi Rodopoulou, 2023). This not only strengthens brand identity but also enhances the company's connection to its historical roots.*

Another critical implication is the value of community engagement. Involving local stakeholders, such as residents, students, and cultural organizations, in heritage projects fosters social sustainability and builds trust (Dempsey et al., 2011; Stevenson, 2021). This collaborative approach strengthens the company's relationship with the territory and ensures that heritage initiatives resonate with the community. Additionally, innovative storytelling through multimedia formats, such as short films and interactive exhibits, can effectively communicate corporate history. This strategy differentiates the brand and appeals to both traditional and modern audiences, blending the past with contemporary relevance (Vacca, 2024; Zacheo et al., 2024).

The development of inclusive and adaptive governance models is crucial for the long-term success of heritage projects. Collaboration with policymakers and cultural organizations ensures transparent, participatory management that adapts to evolving social and technological contexts (Mohanty et al., 2024; Scaffidi, 2024). The Dublo project illustrates how industrial heritage can become a dynamic asset that drives innovation, strengthens community sustainability, and enhances competitive advantage-particularly in industries with strong historical foundations, such as fashion and manufacturing, where balancing tradition and innovation is key to sustainable growth.

Originality of the paper. *The originality of this paper lies in its ability to reinterpret corporate industrial heritage as a strategic lever for social sustainability and digital innovation, moving beyond the traditional conception of corporate heritage as mere preservation of the past. The interdisciplinary approach integrates heritage management, territorial governance, and digital transformation, proposing a model that enhances the connection between corporate identity, community, and sustainable development (Balmer, 2011; Montella, 2024).*

From an academic perspective, the paper introduces an innovative application of the Delphi method to analyze the role of corporate heritage in strengthening territorial identity and promoting social participation. While the Delphi method has already been employed in governance studies, its application to the sustainability of historic brands represents a significant contribution, particularly in the fashion industry, where balancing craftsmanship, digitalization, and sustainability is crucial (Scaffidi, 2024; Chatzi Rodopoulou, 2023). From a managerial perspective, the study highlights how the digitalization of corporate archives, as exemplified by the Dublo Fashion Heritage project, transforms corporate memory into a dynamic asset, generating value through education, cultural tourism, and corporate storytelling. This approach not only preserves the cultural capital of firms but also strengthens their competitive positioning and connection with the local territory (Pardo Abad, 2019; Vacca, 2024). The adoption of a multi-stakeholder approach further reinforces the social sustainability of corporate heritage, fostering collaboration among businesses, institutions, and local communities (Spielmann et al., 2021).

The paper proposes a replicable model for enhancing corporate heritage through the integration of digital innovation, territorial identity, and social sustainability, contributing to the scientific debate and offering practical insights for managers and policymakers engaged in the management of industrial heritage (Mohanty et al., 2024).

Key words: *Corporate Industrial Heritage; Social Sustainability; Territorial Identity; Innovation; Community Engagement; Digitalization.*

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L’approccio strategico alla catena di fornitura: il caso ERG S.p.A.

CHIARA DE BERNARDI[1] MARCO FREY[2]

Abstract

La gestione della catena di fornitura è un tema centrale nel contesto attuale, che spinge le imprese a monitorare e valutare i propri fornitori. Oggi, l'integrazione di criteri di sostenibilità nella supply chain non è più un'opzione, ma una necessità.

Il caso analizza l’esperienza di ERG S.p.A., azienda che ha fatto della gestione sostenibile della catena di fornitura un elemento di governance, prima che ambientale e sociale. Il raggiungimento dei suoi obiettivi ESG al 2040 passa necessariamente dalla transizione verso un modello sostenibile di tutti i suoi fornitori, nonché dal loro coinvolgimento.

Obiettivi e risultati di apprendimento. *Il caso si propone di:*

1. *conoscere ERG S.p.A., una realtà che ha fatto della gestione sostenibile della propria catena di fornitura una scelta di governance strategica di lungo periodo;*
2. *comprendere a fondo il tema della catena di fornitura, sempre più rilevante nel contesto attuale e normativo;*
3. *capire i benefici che la considerazione della propria catena di fornitura comporta per il proprio business;*
4. *comprendere cosa significa, concretamente, coinvolgere i fornitori nella gestione della loro transizione verso la sostenibilità;*
5. *stimolare la discussione e sviluppare competenze critiche sui benefici e sulle sfide derivanti da progetti di gestione della catena di fornitura.*

Introduzione. *È il 20 dicembre 2024 e per Gianluca Gramegna, Head of Environmental, Social & Governance di ERG S.p.A., è tempo di bilanci: gli obiettivi prefissati sono stati raggiunti? Nell’anno in corso, l’azienda ha continuato, in modo virtuoso, il suo impegno nella gestione e valorizzazione della propria catena di fornitura, da un punto di vista sociale, ambientale, e di governance. Se da un lato è riuscita a coinvolgere più fornitori dell’anno precedente, dall’altro ha implementato nuovi meccanismi premianti per i suppliers più sostenibili.*

Il bilancio, secondo Gramegna, è quindi più che positivo. Soddisfatto, si prepara al nuovo anno ma, soprattutto, alle nuove sfide che esso porterà.

La storia di ERG: dalle fonti fossili alle rinnovabili. *La storia di ERG ha inizio a Genova nel 1938, con Edoardo Garrone, come azienda specializzata nella raffinazione e distribuzione di prodotti petroliferi. L’evoluzione di ERG, dalla fondazione fino ai nostri giorni, vede tre tappe fondamentali. Se per i primi settant’anni cresce nel settore petrolifero, a partire dal nuovo millennio inizia un percorso di transizione verso le rinnovabili, fino ad arrivare ai nostri giorni, con l’obiettivo di affermarsi come leader di mercato nella transizione energetica. Vediamole più nel dettaglio.*

In primis, durante il Dopoguerra, con l'obiettivo di contribuire alla ripresa economica e sociale del Paese, ERG avvia la Raffineria di Genova San Quirico, rispondendo alla crescente domanda di combustibili. Nei successivi sessant'anni, opera nel settore oil, diventando uno dei principali player del mercato e il primo gruppo petrolifero privato italiano, con una vasta rete di distributori in tutta Europa. Inoltre, nel 1993, l'azienda entra nel mercato della produzione elettrica fondando ISAB Energy, società dedicata alla realizzazione del primo impianto italiano di gassificazione degli oli pesanti per la produzione di energia elettrica.

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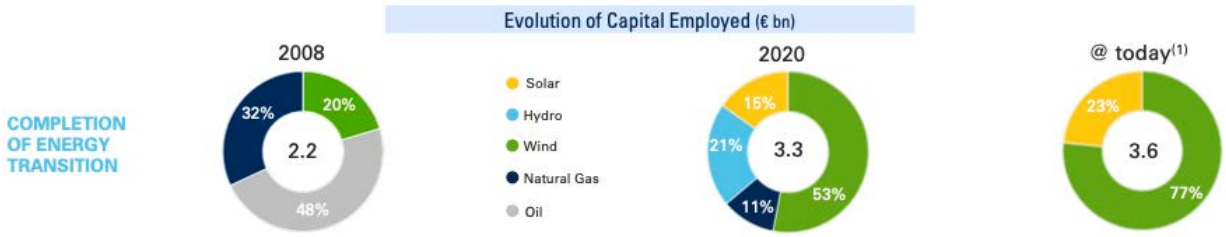
Ascolta i **podcast** sulla storia di ERG!
La fondazione (1938-1963)
Gli anni dello sviluppo industriale (1963-1980)
L'ingresso nel mercato energetico (1980-2001)

Nel corso degli anni, la società ha saputo interpretare i mutamenti del mercato, evolvendosi senza mai rinnegare le proprie radici. A partire dal 2008, ERG ha avviato infatti un processo di trasformazione da compagnia petrolifera tradizionale a operatore multi-energy, con l'obiettivo di consolidare la propria presenza nel settore delle energie rinnovabili. Questa scelta non è stata dettata da ragioni di immagine, rappresentando una scelta industriale mirata a garantire una crescita sostenibile. Ma non è tutto. Nel tempo, il gruppo ha poi adottato una decisione ancora più radicale: dismettere progressivamente le attività legate al petrolio per concentrarsi esclusivamente sulle fonti rinnovabili. Tale transizione ha richiesto una ridefinizione del core business e una trasformazione strutturale del modello operativo, mantenendo come elemento guida il concetto di "fare energia". I proventi derivanti dalla cessione delle attività petrolifere sono stati reinvestiti nello sviluppo delle fonti rinnovabili, con particolare attenzione all'eolico e all'idroelettrico. L'obiettivo? Ridefinire il posizion amento e il core business aziendale.

Ascolta il **podcast** sulla storia di ERG!
Dalla seconda alla terza generazione (2001-2013)

Negli ultimi anni, ERG completa la transizione verso una struttura interamente basata sulle energie rinnovabili, adottando il modello "Wind&Solar". Nel 2021, avvia la riorganizzazione del portafoglio investimenti e nel 2022 cede le attività idroelettriche a Enel Produzione, seguite nel 2023 dalla cessione delle attività termoelettriche ad Achernar Assets AG. Grazie a questa strategia, ERG si allinea pienamente ai principi ESG e agli obiettivi di sviluppo sostenibile delle Nazioni Unite, diventando un operatore esclusivamente dedicato alle energie rinnovabili (100%) (Figura 1).

Fig. 1: L'evoluzione del modello ERG S.p.A



Fonte: elaborazione ERG

Anticipare le tendenze di mercato e rinnovare profondamente la propria strategia aziendale: questi sono i due punti cardine di ERG per diventare leader nel settore delle rinnovabili, sia a livello nazionale che europeo.

Oggi, ERG continua a investire nelle proprie aree strategiche per rafforzare il proprio ruolo in Italia e in Europa. Come afferma il Presidente Edoardo Garrone "oggi che siamo uno dei primi produttori europei indipendenti di energia elettrica da fonti rinnovabili, posso dire che oltre a essere stati capaci di anticipare i tempi, ci inorgoglisce il fatto di svolgere un ruolo da protagonisti fra gli operatori industriali nella costruzione di un mondo rispettoso dell'ambiente e attento alle generazioni future". Sebbene sia già protagonista del processo di decarbonizzazione in atto a livello globale, ERG intende proseguire nel suo percorso di crescita, continuando a investire nei suoi ambiti strategici per consolidare ulteriormente il suo ruolo di riferimento in Italia e in Europa.

La transizione di ERG verso un modello interamente basato su energia eolica e solare ha comportato una gestione diretta degli impianti e una presenza capillare sul territorio. In questo contesto, la creazione di valore sostenibile per tutti gli stakeholder e l'integrazione di un approccio ESG sono stati elementi centrali nella strategia aziendale. La sostenibilità in ERG si fonda su quattro pilastri, strettamente connessi e integrati nel modello di business (Figura 2):

1. *Planet: contrasto al cambiamento climatico;*
2. *Engagement: supporto ai territori e alle comunità locali;*
3. *People: attenzione alla crescita e al benessere dei dipendenti;*
4. *Governance: adozione di principi e organi di gestione ispirati alle best practice internazionali.*

Fig. 2: Strategia ESG 2025-2029

Fonte: sito ERG
(https://www.erg.eu/it/sostenibilita/esg-at-the-core-of-erg-strategy)

Questi elementi sono pienamente allineati con gli obiettivi dell'Agenda 2030 delle Nazioni Unite per lo sviluppo sostenibile. "Stiamo implementando il nostro piano ESG, che contiene al suo interno numerosi obiettivi di sostenibilità. Nello specifico, abbiamo assunto l'impegno di diventare Net Zero entro il 2040, dieci anni prima dei target fissati a livello europeo" spiega Garrone. A maggio 2024, il Consiglio di Amministrazione di ERG ha approvato l'aggiornamento del piano industriale 2024-2026, che integra al suo interno il piano ESG (Environmental, Social e Governance).

Per garantire una piena sinergia tra business e sostenibilità, ERG è fortemente impegnata nello sviluppo di un sistema di governance della sostenibilità, dotato di strutture e organismi operativi dedicati al monitoraggio e allo sviluppo delle attività sostenibili, che permettono il raggiungimento degli obiettivi e del percorso strategico, articolato in tre fasi chiave:

- *produzione e vendita di energia al 100% da fonti rinnovabili*
- *consumo energetico basato al 100% su fonti rinnovabili*
- *collaborazione e consolidamento dei rapporti con i principali stakeholder.*

Partendo da questo terzo obiettivo, il caso si focalizza su una categoria specifica di stakeholder: i fornitori. Per ERG la catena di fornitura è un elemento fondamentale per il raggiungimento dei propri obiettivi di sviluppo sostenibile. Composta principalmente da fornitori di componenti principali per parchi eolici e solari, appaltatori di opere civili, elettriche e strumentali, oltre a fornitori di servizi informatici, di gestione delle infrastrutture e di supporto alle attività di business e staff, essa è fondamentale per una gestione etica e sostenibile.

La catena di fornitura. *La trasformazione del sistema energetico, accompagnata dall'innovazione digitale, sta ridefinendo le modalità di esecuzione dei lavori e di fornitura di beni e servizi, rendendo i fornitori partner essenziali per garantire uno sviluppo sostenibile nell'ambito in cui ERG opera.*

Secondo l'analisi di materialità condotta da ERG nel 2023[3], la catena di fornitura risulta un tema rilevante, nonché pilastro fondamentale della strategia ESG. A titolo di esempio, infatti, se dal punto della materialità d'impatto (impact materiality), un rischio potrebbe essere quello di non gestire i fornitori secondo logiche di Governance che prevedono, ad esempio, la sottoscrizione del Codice Etico o del Codice di Condotta Fornitori, un'opportunità è invece rappresentata dalla possibilità di avviare procedure di selezione e gestione dei fornitori che valutino i temi ESG. Dal punto di vista della materialità finanziaria (financial materiality), invece, un rischio è rappresentato dagli eventi metereologici estremi che possono causare danni a impianti / infrastrutture o interruzione nella supply chain, o ancora il subire impatti reputazionali causati dall'inadeguata gestione dei diritti dei lavoratori (es. incidenti HSE; human rights); al contrario,

[3] La dichiarazione di carattere non finanziario di ERG è disponibile al sito: https://www.erg.eu/c/document_library/get_file?uuid=f023be95-9358-fd6e-0a91-8f5d8ab7c9dd&groupId=10181&version=1.0. Analisi materialità a pagina 30.

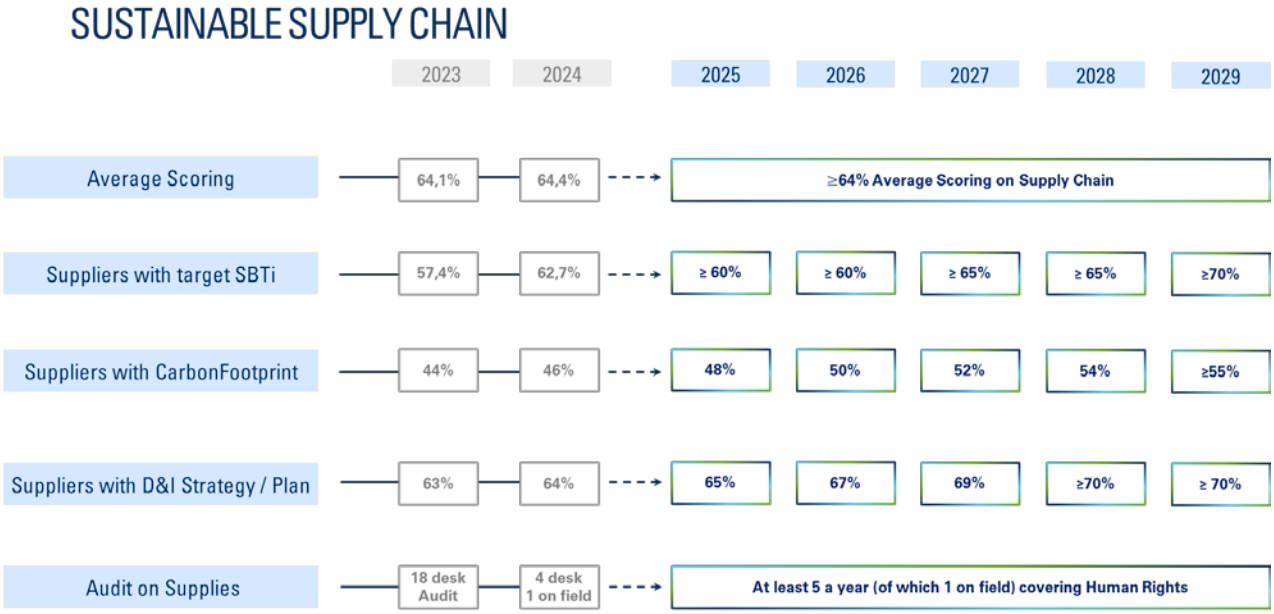
le opportunità possono essere la creazione di una supply chain virtuosa che ha un piano ESG o ha definito specifici obiettivi (es. D&I, diritti umani), o addirittura poter certificare l'intera catena di fornitura.

Questa prospettiva, adottata da ERG, e che vede le imprese assumere un ruolo proattivo nell'attuazione di programmi di sostenibilità nella supply chain, costituisce il fondamento delle più recenti normative europee (es. CSRD[4], CSDDD[5]). Infatti, integrare strategie e obiettivi di sostenibilità nella gestione della catena di approvvigionamento sta diventando non solo sempre più rilevante per il settore privato, ma anche essenziale. Negli ultimi anni, l'integrazione delle questioni ambientali e sociali nella gestione della catena di fornitura e, più in generale, nella catena del valore, ha ricevuto una crescente attenzione (Gualandris et al., 2015). Di conseguenza, le imprese hanno progressivamente adottato pratiche che, anche in risposta agli sviluppi normativi più recenti, si sono evolute nel tempo. Se inizialmente l'attenzione era rivolta principalmente agli stakeholder interni, oggi le operazioni esterne assumono un ruolo sempre più rilevante (Gualandris & Kalchschmidt, 2014; Pagell & Wu, 2009). Lo conferma il numero di imprese impegnate nell'integrazione della sostenibilità, non solo all'interno dei propri stabilimenti, ma anche lungo l'intera filiera - includendo fornitori e clienti - cresciuto in modo significativo. Inoltre, sebbene le catene di fornitura globali siano dominate da imprese multinazionali (MNE), le piccole e medie imprese (PMI) vi giocano un ruolo sempre più rilevante (Amighini et al., 2023). Questo fenomeno è ancora più evidente nel contesto europeo, dove le PMI rappresentano il 99% delle imprese (Note sintetiche sull'Unione europea, 2024).

Data la rilevanza della supply chain e della funzione procurement, nei prossimi paragrafi vedremo come si è evoluto l'impegno di ERG verso i suoi fornitori, sempre nell'ottica della creazione di valore, dal punto di vista ambientale, sociale, e di governance. ERG, infatti, nel 2023 dichiara il suo impegno al raggiungimento del Net Zero entro il 2040[6] attraverso alcune azioni sia sul breve al 2027 (near-term target), che nel lungo periodo (long-term target). Per raggiungere questi obiettivi, la gestione della catena di fornitura non è un'opzione, ma una necessità.

Partendo dalla Figura 3, che rappresenta gli obiettivi strategici della supply chain, capiremo come l'azienda abbia fatto della gestione della catena di fornitura un elemento di governance strategica.

Fig. 3: Gli obiettivi di sostenibilità nella gestione della catena di fornitura



Fonte: elaborazione ERG

I cinque obiettivi indicati in Figura rappresentano dei veri e propri main streams che ERG adotta per, da un lato, implementare e, dall'altro, monitorare, l'integrazione della sostenibilità all'interno della supply chain. Vediamoli:

1. *average scoring: si tratta di un punteggio di sostenibilità della catena di fornitura. In altre parole, significa garantire che la supply chain abbia un punteggio medio sopra una certa soglia. Nel 2024 era 64,4%. Nei paragrafi seguenti, vedremo come ERG si impegna nel miglioramento continuo di questo obiettivo;*
2. *suppliers with target SBTi: indica la percentuale di fornitori che hanno approvato i loro obiettivi di decarbonizzazione. Al 2024, sono il 62,7%. Ma ERG mira ad arrivare a circa il 70% al 2030/2035. Dato l'obiettivo*

4 CSRD – Corporate Sustainability Reporting Directive
5 CSDDD – Corporate Sustainability Due Diligence Directive
6 I target di riduzione delle emissioni di gas a effetto serra (GHG) del Gruppo ERG, in linea con la soglia necessaria a mantenere l'aumento della temperatura globale entro 1.5°C, sono stati approvati dalla Science Based Target initiative (SBTi) – organizzazione internazionale che supporta le aziende di tutto il mondo nella definizione di strategie efficaci per la riduzione delle emissioni di gas serra a favore della lotta contro il cambiamento climatico.

di lungo termine, è essenziale monitorare questo dato. ERG vuole essere consapevole di cosa fanno i propri suppliers. Avere un target approvato, significa sviluppare, conseguentemente, una strategia per attuarlo;

3. *suppliers with Carbon Footprint: diversa dal punto 2, la percentuale del 46% al 2024 indica tutti quei fornitori che già eseguono il calcolo della carbon footprint (es. di organizzazione, di prodotto). Negli anni, ERG mira ad incrementare questo numero: nei prossimi paragrafi è descritto come;*
4. *suppliers with D&I Strategy/Plan: un elemento di differenziazione rispetto alle strategie di gestione della catena di fornitura di molto aziende, è l'attenzione alla componente sociale di Diversity & Inclusion. Elemento fondamentale per ERG, l'azienda vuole assicurare che lungo la propria supply chain sia garantita la stessa stessa parità retributiva, le stesse opportunità per uomini e donne, e così via; nel 2024 questo dato si attesta al 64%*
5. *audit on suppliers: come vedremo nei prossimi paragrafi, ERG svolge audit periodici presso i propri fornitori. Per capire cosa realmente fanno i diversi partner, ERG "entra in casa loro", va in campo.*

Nei paragrafi seguenti, partendo dai progetti messi in campo da ERG, capiremo come l'azienda si impegni nel raggiungimento di questi obiettivi. Le parole di Gianluca Gramegna, ci aiuteranno nella comprensione.

Il Codice di Condotta per i Fornitori

Con l'obiettivo strategico di rafforzare la sostenibilità all'interno della catena di fornitura, ERG ha capito che è essenziale che le proprie aspettative vengano tradotte in direttive chiare e concrete per i fornitori. Come requisito minimo, a questi ultimi è richiesto il rispetto delle normative nazionali vigenti e, in aggiunta, l'adozione di misure proattive per prevenire danni ambientali e sociali, nonché l'implementazione di meccanismi di rimedio in caso di eventuali impatti negativi. Uno strumento pratico che definisce gli standard di riferimento nelle relazioni commerciali tra azienda e fornitori è il Codice di Condotta per i Fornitori.

Se da un lato esso rappresenta che i supplier aderiscano a tali standard, dall'altro, permette all'azienda di prevenire e mitigare gli impatti negativi più rilevanti sui diritti umani, sul lavoro e sull'ambiente lungo la supply chain. Il Codice crea dunque una base condivisa di aspettative in termini di gestione sostenibile e competitiva della catena di approvvigionamento, assicurando che fornitori, subappaltatori e filiali adottino valori comuni in materia di condizioni di lavoro, salute e sicurezza, impatti ambientali ed etica aziendale.

Dal momento che ERG attribuisce grande importanza alla costruzione di relazioni trasparenti e durature con i propri partner di filiera, promuovendo i valori e i principi sanciti nel Codice Etico che guida le attività aziendali, nel 2019, ERG ha introdotto il Codice di Condotta Fornitori, che definisce le norme e i comportamenti da adottare lungo l'intera catena di approvvigionamento. Le disposizioni del Codice si basano sui principi delle Convenzioni fondamentali dell'Organizzazione Internazionale del Lavoro (ILO), sulla Dichiarazione Universale dei Diritti Umani e sui dieci principi del Global Compact delle Nazioni Unite.

Nel novembre 2024, il Network Italiano del Global Compact ha pubblicato le **Linee Guida per la stesura del Codice di Condotta Fornitori**, un documento strategico volto a coinvolgere i fornitori e a generare un **impatto positivo lungo le filiere produttive**.
Consulta QUI il documento!

La funzione Procurement è responsabile dell'aggiornamento periodico del Codice, in collaborazione con le unità competenti, per garantirne l'adeguamento alle normative vigenti e alle nuove esigenze aziendali. Il rispetto di tali regole è vincolante per tutti gli appaltatori, subappaltatori e partner commerciali, che si impegnano ad aderire ai valori del Gruppo lungo l'intera filiera. Attraverso la funzione Procurement, che è responsabile dell'aggiornamento periodico del Codice per garantirne l'adeguamento alle normative vigenti e alle nuove esigenze aziendali, ERG mira al rispetto di tali regole da parte di tutti gli appaltatori, subappaltatori e partner commerciali, che si impegnano ad aderire ai valori del Gruppo lungo l'intera filiera.

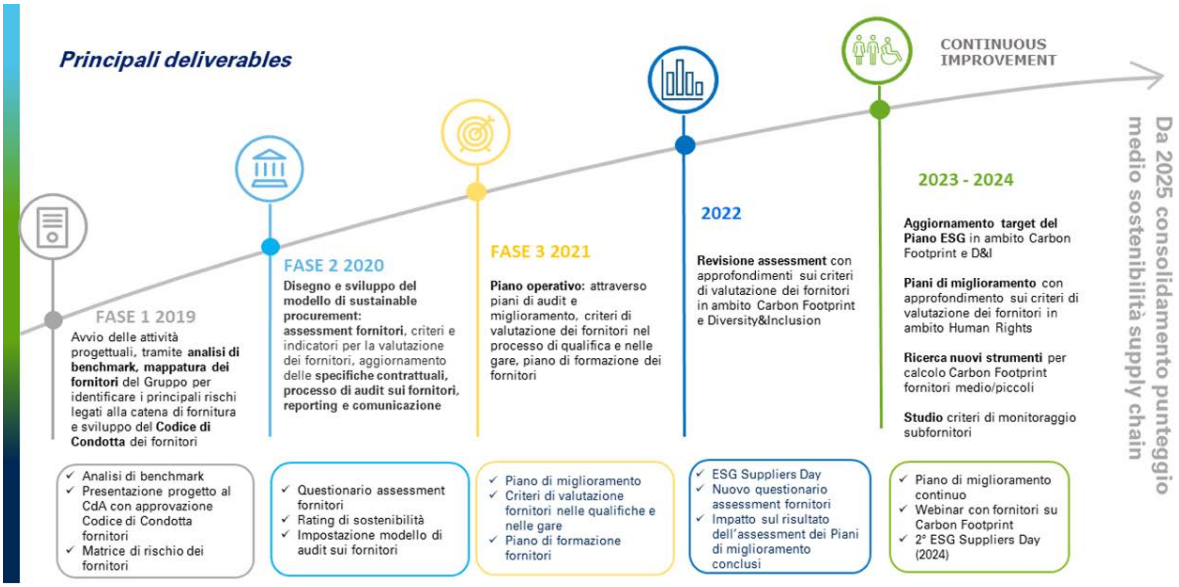
Consulta QUI il **Codice di Condotta Fornitori** di ERG.

Importante è sottolineare come il Codice di Condotta non debba essere un elemento isolato, ma uno strumento integrato con le policy aziendali in materia di sostenibilità e richiede l'implementazione di meccanismi di due diligence e controllo, affinché la sua applicazione sia effettiva e concreta.

Il progetto "Sustainable Procurement"

Una delle iniziative di cui Gramegna è più orgoglioso è il progetto "Sustainable procurement", un piano strategico volto a integrare criteri di sostenibilità nei processi di valutazione e selezione della filiera, in linea con il modello di business di ERG. Come si evince dalla Figura 4, il progetto è iniziato nel 2019, quando viene approvato dal CdA il Codice di Condotta fornitori e viene svolta una prima mappatura dei fornitori del Gruppo per identificare i principali rischi legati alla catena di fornitura.

Fig. 4: Il progetto "Sustainable Procurement"



Fonte: sito ERG
(https://www.erg.eu/it/fornitori/sustainable-procurement)

L'iniziativa si propone di individuare eventuali criticità attraverso strumenti di monitoraggio e piani di miglioramento mirati, nonché di valorizzare e premiare i fornitori che adottano pratiche esemplari in ambito di sostenibilità. Per farlo, negli anni, la funzione Procurement ha sviluppato una metodologia ad hoc per valutare la supply chain. Se nel 2020 ha ideato un questionario (di circa 100 domande) per la valutazione dei fornitori, nonché impostato un modello di audit, nel 2021 ha invece sviluppato un piano di miglioramento e un piano di formazione per i fornitori.

Con cadenza annuale, ERG effettua una selezione di fornitori con cui ha collaborato negli ultimi due anni. Tali fornitori vengono invitati a compilare il questionario per valutare la loro performance in termini di sostenibilità, con l'obiettivo di attribuire loro un punteggio da utilizzare come criterio nelle gare d'appalto. Un significativo passo avanti è avvenuto nel 2021, quando l'azienda ha ampliato il perimetro di valutazione della sostenibilità, includendo 150 fornitori strategici che rappresentano circa l'80% del volume d'affari. L'adesione è stata elevata (89% dei fornitori invitati) ed è avvenuta su base volontaria. Ha visto un rating medio di sostenibilità in crescita significativa rispetto all'anno precedente. In particolare, nel 2023 il rating medio ha raggiunto il 64,1%, con un incremento di 3 punti percentuali rispetto al 2022 e di 14,4 punti rispetto al 2020, primo anno di valutazione. Tale progresso rappresenta un traguardo chiave per l'azienda, in linea con gli obiettivi stabiliti dal Top Management e approvati dall'ESG Committee e dal Consiglio di Amministrazione. Questi risultati evidenziano come l'evoluzione del contesto e le azioni intraprese da ERG abbiano incentivato un numero crescente di fornitori ad adottare politiche di sostenibilità.

*"Come raggiungiamo quel 64%? Ingaggiamo tutta la nostra catena di fornitura e **chiediamo di compilare un questionario** di self-assessment. Una volta che viene fatto assessment, **ogni fornitore riceve uno scoring**.*
Ai fornitori con uno scoring basso, chiediamo di attuare delle strategie di miglioramento, e l'anno successivo, andiamo a monitorarli attraverso degli audit, dei momenti in cui il fornitore ci fa entrare in casa sua, e noi capiamo davvero cosa sta facendo. I fornitori non si autocertificano, ma è una nostra strategia per toccare con mano ciò che realmente dichiarano. Andiamo direttamente in campo.
*Ma la cosa interessante è i fornitori, in tutto questo processo, non pagano niente. Allora perché lo facciamo? È una scelta strategica. Perché ci serve. Con l'obiettivo di diventare net zero, siamo obbligati a coinvolgere i fornitori per permettere loro di **cambiare la loro cultura sulla sostenibilità**. E loro sono interessati a farlo: hanno tutti scelto partecipare all'assessment in modo **volontario**, non sono stati obbligati. Abbiamo raggiunto una **retention del 86%...** è incredibile"*

Non da ultimo, un elemento di novità è stato l'ampliamento delle tematiche dell'indagine. Nel 2022 e nel 2023, infatti, in aggiunta agli ambiti della gestione aziendale, diritti dei lavoratori, tematiche sociali e ambientali, sicurezza sul lavoro, gestione della catena di fornitura e impegno per la diversità e l'inclusione, si è riservata un'attenzione particolare alla carbon footprint e alla Diversity & Inclusion, utilizzando una scala di valutazione allineata alle best practice di settore. I risultati? In entrambe le aree sono stati soddisfacenti, soprattutto per le aziende di maggior dimensione che movimentano con ERG volumi di acquisto significativi. Per incentivare un miglioramento continuo della performance dei fornitori in questi ambiti strategici, nel 2024, oltre a

realizzare nuove campagne di sensibilizzazione e formazione, ERG ha introdotto un concorso dedicato a queste due tematiche, con l'obiettivo di promuovere best practice e premiare le aziende che si distinguono per l'eccellenza nelle performance di sostenibilità.

Sempre nel quadro del progetto Sustainable Procurement, un'iniziativa di successo che merita attenzione è l' "ERG ESG Suppliers Day", un evento dedicato al coinvolgimento e alla premiazione dei fornitori più virtuosi in ambito di sostenibilità, partito nel 2022 e ripetuto nel 2024.

Le emissioni lungo la supply chain

Un elemento chiave della strategia di sostenibilità di ERG riguarda la gestione delle emissioni lungo la catena di fornitura. L'impegno dell'azienda nella lotta al cambiamento climatico si concretizza, in primo luogo, attraverso la misurazione delle emissioni dirette (Scope 1) e indirette (Scope 2 e 3) e, successivamente, mediante strategie di riduzione e compensazione. Le emissioni di Scope 3 rappresentano oltre il 99% del totale, con la quasi totalità attribuibile alla supply chain: ciò evidenzia l'importanza di un approccio integrato che coinvolga l'intero ecosistema dei fornitori.

Con l'obiettivo di migliorare la misurazione delle emissioni lungo la catena del valore, ERG ha adottato un approccio basato sugli studi LCA (Life Cycle Assessment) forniti dai fornitori stessi per il calcolo delle emissioni di Scope 3 nei settori eolico e fotovoltaico. Per quanto concerne le emissioni generate dai viaggi aziendali (ad esempio, trasporti aerei e ferroviari), il calcolo è affidato a un'agenzia specializzata che opera secondo metodologie certificate. Inoltre, grazie a una collaborazione con il corriere responsabile della logistica aziendale, ERG ha potuto quantificare e compensare le emissioni legate al trasporto dei materiali mediante progetti di tutela climatica.

*"Abbiamo dichiarato di diventare net zero al 2040: **non possiamo farlo senza catena fornitura**. Se i miei fornitori non hanno un target approvato, devo mettere in atto strategie, oppure devo cambiare fornitori. […] La nostra strategia di sostenibilità prevede dunque di **selezionare sempre più fornitori che abbiano performance di sostenibilità** che vadano nella direzione di definire e certificare gli obiettivi di Carbon Footprint. […]*
*Se da un lato ci sono i fornitori che hanno quindi **un target approvato**, ma che non hanno necessariamente già **calcolato** la propria **carbon footprint**, dall'altro ci sono quelli che l'hanno fatto. Il nostro obiettivo è di migliorarci anno su anno, e incrementare la % di fornitori che eseguono questo calcolo. Come lo facciamo? In questo caso, sono due anni che attuiamo un **programma** in cui con i fornitori che vogliono partecipare, facciamo un **webinar** in cui spieghiamo cosa vuol dire calcolare la CF nello scope 1, 2, e 3 e come implementare tale processo di misurazione. Ma più importante, diamo loro **strumenti di misurazione**. Stiamo anche cercando di individuare un software, per fornitori, in grado di aiutarli a calcolare la CF. Posso garantire che soprattutto le PMI devono fare investimenti importanti per poter calcolare la CF e noi vogliamo supportarli da questo punto di vista".*

Sulla base di questi dati, ERG intende implementare ulteriori misure di riduzione delle emissioni nei prossimi anni, privilegiando fornitori con performance ambientali avanzate e promuovendo iniziative di decarbonizzazione. Ad esempio, tra gli obiettivi strategici, ve ne è uno chiaro: l'incremento della percentuale di fornitori che monitorano la propria carbon footprint, con un aumento del 2% rispetto al valore di riferimento del 44% registrato nel 2023.

La due diligence dei fornitori

Un ulteriore aspetto degno di nota è l'implementazione della due diligence di terze parti. Infatti, tutti i fornitori ma, più in generale, le terze parti, con cui ERG si interfaccia, o desidera farlo, sono soggette ad uno screening relativo ai rischi finanziari e i rischi ESG/reputazionali.

*" Quando selezioniamo i fornitori, la componente economica ormai è fissa, è quasi data per scontata. **Sono altre le variabili in gioco**: la reputazione, i procedimenti giudiziari sulla società e/o su amministratori e manager, e molto altro. Diamo un **peso rilevantissimo** alle componenti ESG"*

Questo processo è per ERG cruciale perché, nel momento in cui viene a mancare la sostenibilità economico-finanziaria, la controparte rischia di minare la relazione con l'azienda. Inoltre, abbracciando il nuovo modello di business orientato alle rinnovabili, ERG, anche per questioni reputazionali, deve scegliere accuratamente i propri fornitori. Per questo motivo, tutti i fornitori sono sottoposti a un rigoroso processo di valutazione della reputazione, che comprende un monitoraggio continuo a livello globale. Vengono analizzate sanzioni e segnalazioni relative a rischi ambientali, finanziari, informatici, legali e sociali (tra cui il rispetto dei diritti umani e le norme sul lavoro). Tale valutazione, che si estende per tutta la durata del contratto, è finalizzata a garantire la conformità ai principi etici e normativi da noi adottati. La violazione di tali principi comporta l'immediata interruzione di qualsiasi rapporto contrattuale e l'esclusione dalla Vendor List

Il procurement come elemento di governance. *Le iniziative analizzate ci fanno comprendere come ERG riconosca la catena di fornitura come un elemento chiave per il raggiungimento dei suoi obiettivi di sviluppo sostenibile e, in particolare, di Net Zero, al 2040.*

Come ha sottolineato Gramegna, l'engagement della supply chain diventa una necessità che deve essere "governata". Per questo motivo, essa è, a tutti gli effetti, un elemento di governance. Come si può vedere dalla Figura infatti, la sustainable supply chain rientra nel quarto pilastro della strategia ESG di ERG. Sebbene i progetti descritti riguardino soprattutto le dimensioni ambientale (es. emissioni e carbon footprint) e sociale (es. D&I), la dimensione della governance diventa indispensabile per una corretta pianificazione e implementazione.

Quanto la gestione della supply chain sia integrata nella governance è visibile dalla Figura 5, che ci mostra come l'MBO (management by objective) del 2024 sia legato ad obiettivi di sostenibilità.

Fig. 5: Obiettivo Sostenibilità - MBO 2024

Governance	**10,0%**	1) Implementazione interna del Piano di Adeguamento della CSRD 2) Incremento % in volume dei fornitori che monitorano la Carbonfootprint (+2% vs 44% baseline 2023) 3) Sustainable Procurement: Scoring medio dei fornitori (≥ 64 punti)

Fonte: elaborazione ERG

Ma di cosa si tratta? Significa che ciascuno dei componenti del top e middle management all'interno dell'azienda, nel concordare gli obiettivi che dovrà raggiungere nel corso dell'anno e che costituiscono la componente premiante della sua retribuzione, tiene conto della sostenibilità e, in particolare, della catena di fornitura. Ecco che l'MBO diventa quindi uno strumento importantissimo: la sostenibilità prende corpo davvero all'interno della logica di ricaduta dentro l'impresa quando i sistemi classici, proprio come l'MBO, includono obiettivi di tipo ambientale. A cosa serve dunque, concretamente? Ad allineare le scelte che fa il singolo manager alle strategie aziendali. In altri termini, a spingere egli/ella nella selezione dei fornitori sulla base di requisiti di sostenibilità e non solo economici. Il piano strategico e, a cascata, le singole strategie operative, devono essere allineate. Gli obiettivi della gestione della supply chain vengono integrati, diventano obiettivi trasversali all'azienda.

La governance, dunque, mostra due tipologie di obiettivi (Figura 5): in primis, la CSRD, quindi la rendicontazione. In secundis, il procurement. Questo significa che la rendicontazione e il procurement diventano elementi di governance applicata. Se la governance, ad un più alto livello, ci dice che come è formato il board, quali sono i comitati, come un'impresa paga le tasse, ecc. - in altri termini, tutti gli aspetti che riguardano i vertici dell'azienda -, quando essa è calata dentro la struttura organizzativa entra nel merito di alcuni processi fondamentali. Uno di questi, per ERG, è la gestione della catena di fornitura. Sebbene essa potrebbe essere trasversale anche alla dimensionale E (environment) o a quella S (social), viene però inquadrata come processo di governance: è così importante per gli obiettivi strategici aziendali, in particolare la decarbonizzazione, che ERG deve governance quel percorso. Non può permettersi di non raggiungere i risultati prefissati.

Conclusione. *L'impegno di ERG nella creazione di una catena di fornitura sostenibile si concretizza in diverse forme. Per rafforzare la sostenibilità all'interno della catena di fornitura, l'azienda ha capito che è essenziale che le proprie aspettative vengano tradotte in direttive chiare e concrete per i fornitori, ma soprattutto che quest'ultimi vengano accompagnati nella transizione. Se infatti le percentuali di engagement dei fornitori, calcolo della carbon footprint, ecc., già raggiunte da ERG siano elevate, bisogna anche considerare che, nella maggior parte dei casi, i fornitori analizzati o che hanno partecipato alle iniziative sono soggetti di grandi dimensioni, che hanno quindi una certa consapevolezza del tema e, nella maggior parte dei casi, una strategia propria di sostenibilità. La vera sfida, nei prossimi anni, è andare oltre, è conquistare quei punti percentuali aggiuntivi: sfida molto difficile, ma estremamente significativa perché, in questo modo, occorre mettere in moto il sistema complessivo, coinvolgendo anche le imprese più piccole.*

Per Gramegna, l'anno nuovo è anche tempo di buoni propositi. Il successo delle iniziative ha aperto la strada a nuove sfide, su cui il manager si interroga. Come può ERG continuare a migliorarsi? Potrebbe introdurre controlli mirati su tematiche specifiche, come il rispetto dei diritti umani, alla luce dell'approvazione della CSDDD? Potrebbe esaminare la sostenibilità dei subfornitori all'interno della catena di approvvigionamento dei principali fornitori strategici?

Domande per la discussione? ***(le risposte saranno sviluppate nelle TN: si riporta qui una breve ipotesi)***

1. Quali possono essere state, a tuo parere, le sfide affrontate da ERG nell'implementazione dei progetti di sustainable procurement?

   La risposta sarà costruita fornendo alcuni spunti di riflessione. Probabilmente sarà condotta un'altra intervista ad hoc a Gianluca Gramegna.

2. Partendo dal racconto di ERG, perché, secondo te, può essere strategico adottare un Codice di Condotta per Fornitori?

   Esempio risposta:
   L'adozione del Codice può portare vantaggi significativi per l'azienda:
   - *migliorare la gestione del rischio con fornitori qualificati secondo criteri ESG;*
   - *rafforzare la brand reputation grazie a una supply chain allineata agli standard aziendali;*
   - *garantire la compliance normativa a tutti i livelli, in conformità con le regolamentazioni vigenti;*
   - *potenziare il reporting e i KPIs per rispondere alle nuove direttive;*
   - *promuovere la sostenibilità tra i fornitori, supportandoli nell'innovazione e nello sviluppo di modelli di governance sostenibili;*
   - *ecc.*

3. Il Network Italiano del Global Compact ha pubblicato, nel 2022 il position paper intitolato "La gestione sostenibile delle catene di fornitura: tra responsabilità e opportunità per le imprese". All'interno del documento, vengono descritte le fasi per una gestione sostenibile (figura). Come si è comportata ERG con riferimento ad ognuna di esse? Ci sono margini di miglioramento?

   La risposta sarà costruita indicando per ciascuna fase le azioni di ERG.

4. Immagina di essere un fornitore di ERG di piccole-medie dimensioni. Quali sono le tue necessità per implementare azioni di sostenibilità e come può aiutarti ERG?

   La risposta sarà costruita fornendo alcuni spunti di riflessione.
   Sarà fornita anche un'ipotesi di svolgimento in cui il docente propone un role playing, in cui si simula un incontro di assessment e discussione fornitori-ERG, dove alcuni studenti rappresentano i fornitori e altri ERG.

5. Al giorno d'oggi si sta affermando una nuova corrente di pensiero secondo cui la catena di fornitura deve essere rigenerativa. Quale evoluzione rispetto ai modelli tradizionali, un approccio rigenerativo genera valore oltre lo zero e richiede un impegno condiviso verso la tutela della natura e della società (Buckton et al., 2023) lungo l'intera catena di fornitura.
   Partendo dallo schema proposto da Gualandris et al. (2024), che individua i tre principi fondamentali per implementare questo approccio, descrivi se e come la strategia di ERG rispecchi tali principi. Ci sono margini di miglioramento?

   La domanda viene formulata dopo che il docente descrive, brevemente, alla classe, il concetto di catena di fornitura rigenerativa e i 3 principi descritti dagli autori citati (figura). Dopodiché si discute della situazione di ERG.

	Proporzionalità	Reciprocità	Poli-ritmicità
Paradigmi tradizionali	Le catene di approvvigionamento contemporanee sono progettate e gestite per ottenere efficienza attraverso la scalabilità e la specializzazione, con poca considerazione per l'equilibrio dei sistemi socio-ecologici.	Le catene di fornitura sono progettate e gestite dall'alto verso il basso da attori potenti, con scarsa considerazione per la qualità delle relazioni reciproche con gli altri membri della catena di fornitura, con le comunità locali e con gli ecosistemi.	Le catene di approvvigionamento sono progettate e gestite per un'elevata reattività alla domanda finale, con scarsa considerazione per i ritmi e i modelli dinamici dei sistemi socio-ecologici
Principi rigenerativi	Gli attori della catena di approvvigionamento identificano e ripristinano una varietà adeguata ed equilibrata di organismi e specie autoctone e adattano la scalabilità e la portata della produzione e del consumo entro le proporzioni che i sistemi socio-ecologici possono meglio tollerare.	I membri della catena di fornitura considerano e co-gestiscono l'impatto reciproco delle loro attività sui sistemi socio-ecologici e viceversa in diverse aree geografiche (compresi i contesti del "Nord globale" e del "Sud globale"), a più livelli (locale e globale) e attraverso orizzonti temporali (breve e lungo termine).	I membri della catena di fornitura considerano la molteplicità dei ritmi simultanei che caratterizzano i sistemi socio-ecologici e prendono decisioni strategiche, tattiche e operative che si allineano con tali modelli ritmici.

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Punti di svolta e passaggi critici nell'evoluzione di Enel: una analisi multidimensionale

MARIO BRUNETTI[1] GIANLUCA VAGNANI[2]

Abstract

Il presente lavoro propone un approccio di analisi statistica multidimensionale della dinamica della vita delle imprese, ed in particolare se questa metodica consente di rilevare particolari cambiamenti e punti critici vissuti. La metodologia proposta è stata applicata ad un'impresa di grandi dimensioni (ENEL S.p.A) che ha attraversato anche forti cambiamenti nella sua storia. I risultati, attrverso l'analisi multidimensionale identificano i punti di svolta critici legati a cambiamenti strategici e contestuali, come la liberalizzazione del mercato e l'internazionalizzazione, con i suoi effetti sulla dinamica dell'efficienza e del dimensionamento delle strutture. Implicazioni teoriche e manageriali sono infine discusse.

Parole chiave: *cambiamenti di contesto, dinamica evolutiva dell'impresa, punti di svolta e passaggi critici*

Inquadramento della ricerca. *Lo studio si inquadra nel tema della crescita dell'impresa, affondando le sue radici nello studio di Penrose (1995) secondo cui la crescita dell'impresa non è considerata un mero aggiustamento verso una dimensione aziendale considerata appropriata, se non anche ottima, ma un processo interno caratterizzato da movimenti cumulativi, in parte incrementali, in parte discontinui, lungo una certa traiettoria di sviluppo. Rispetto a questo inquadramento, la ricerca corrente ha affrontato soprattutto i temi legati alla velocità delle crescita dell'impresa (Sterk, Petr, & Pugsley, 2021) e alla sua potenziale accellerazione (Belitski, Stettler, Wales, & Martin, 2023), ovvero alla capacità dell'impresa stessa di sostenere un prestabilito tasso di crescita per un periodo più o meno lungo, senza peraltro compromettere l'equilibrio economico e quello finanziario (Edwards, 2021), così come le determinanti della crescita, anche nelle imprese di minore (Golinelli, 1974; Lorenzoni, 1990), di più grande dimensione (Vaccà, 1986) e internazionali (Rullani, 1973). Nell'ambito dei richiamati studi, la crescita viene concettualizzata come un processo multidimensionale, ovvero costruito rispetto a dimensioni diverse, per esempio le vendite, la produttività, gli addetti (Belitski et al., 2023).. Oltre a essere un processo multidimensionale, la crescita dell'impresa implica correlazioni più o meno rilevanti tra le dimensioni considerate. Dunque, il processo è multidimensionale e correlato. Infine, il processo di crescita non è regolare, ma dinamico, presentando momenti di cambiamento, sinanco discontinui rispetto al passato. In altre parole, la crescita dell'impresa riguarda dimensioni diverse, interrelated tra loro su percorsi caratterizzati da discontinuità.*

Obiettivo del paper. *Adottando la prospettiva che vede la crescita dell'impresa come fenomeno multidimensionale, interrelato e dinamico, il presente studio si concentra su una grande impresae italiana ENEL, e ne approfondisce la dinamica attraverso oltre mezzo secolo di storia. Questa storia abbraccia un lungo periodo iniziale di circa trenta anni incentrato su continui cambiamenti tesi all'efficientamento di strutture e processi (ambito Italia) e successivamente una intensa fase di espansione estera, che ha generato forti impatti tanto da riconfigurare nel profondo l'assetto complessivo per far fronte a nuove sfide globali. In questo senso, obiettivo del lavoro è cogliere le varie dimensioni della storia di crescita di una impresa, raccontandone i molti fatti accaduti. Quanto raccontiamo è una storia di lavoro e di sacrifici di generazioni di uomini e donne, di scelte strategiche e rischi, di tecnica e innovazioni tecnologiche, di politica e numeri che difficilmente, si ritiene, possano essere rappresentati adeguatamente da una sola variabile o misura di risultato. Orbene, in questa storia lunga d'impresa, utilizzando tecniche multidimensionali di analisi dei dati, si cercherà di cogliere la complessità della crescita dell'impresa, indagandone anche i punti di svolta e passaggi critici. Già a partire dalla semplice osservazione dei grafici riportati in Figura 1 (dinamica degli investimenti e dinamica del personale) si possono evidenziare dei punti di svolta della traiettoria di ENEL nel tempo. Punti di svolta che corrispondono in questo caso ai punti di cambiamento delle relazioni tra capitale (investimenti) e lavoro (personale). È noto che il punto di*

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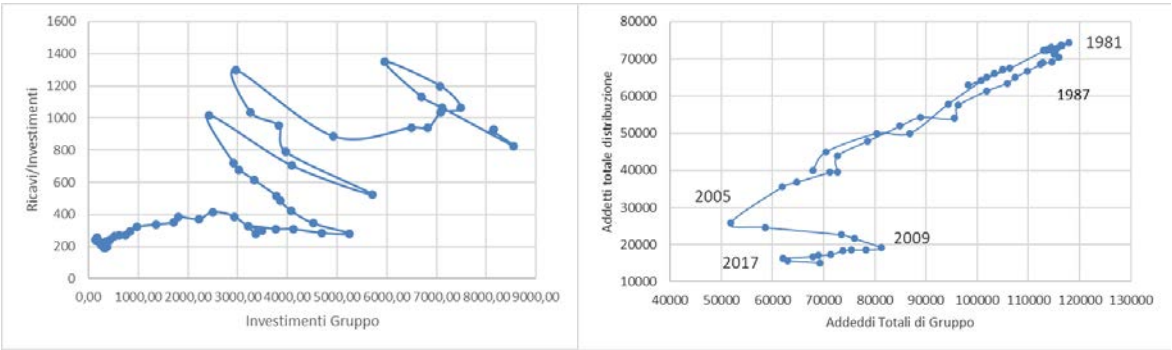
equilibrio tra investimenti e personale é sempre caratterizzato, nel tempo, da elevata variabilità, ed é naturale, pertanto, immaginare l'espandersi di tale relazione ad altri aspetti registrati dai valori di altri indicatori.

L'analisi dei sistemi suggerisce che i periodi di transizione siano preceduti da un deciso aumento delle correlazioni tra le variabili descriventi il sistema rispetto a periodi di esistenza stabile dove le variazioni sono relativamente limitate e confinate all'interno di una zona di 'comfort'. Con l'aiuto delle teniche multivariate dei dati si cercherà così di indagare se queste transizioni del sistema sono limitate alle sole due variabili esaminate (occupazione e investimenti), oppure se non si sia trattato di un fenomeno ben più vasto e complesso, che ha interessato altre componenti importanti del sistema aziendale (clienti, impianti, energia venduta, ricavi, etc.).

Fig. 1: I due grafici riportano il tortuoso tracciato degli investimenti (riquadro a sinistra) e del personale (a destra) riferiti all'intero periodo di indagine (1963-2018).



Metodologia. *In un contesto di analisi di casi di studio (Eisenhardt, 1989; Yin, 2018), un approccio universale dell'analisi dei sistemi suggerisce che in prossimità di una transizione di fase, il sistema si trova sottoposto a un parametro d'ordine che orienta in una direzione specifica i suoi costituenti e facendo quindi passare il sistema da un regime di bassa correlazione (piccole variazioni randomiche) a in regime ad alta correlazione (insorgere di una direzione collettiva di cambiamento). Quest'aumento di correlazione, che precede il vero e proprio cambiamento brusco e massivo dei parametri rilevanti del sistema: da una parte, causato da una "resistenza" del sistema stesso al cambiamento, dall'altra è conseguenza del fatto che la perturbazione influenza contemporaneamente diversi aspetti di contesto esterno cui rispondono. Nel caso delle transizioni di fase però l'aumento di correlazione pone il sistema in una situazione molto critica, poiché uno stato fortemente connesso è molto sensibile alle perturbazioni, in quanto il cambiamento di una parte si ripercuote sull'intero insieme (Gorban, Smirnova, Tyukina, 2010). Si tratta quindi di verificare se questi principi molto generali siano riconoscibili nell'evoluzione temporale dell'azienda attraverso l'analisi delle serie storiche di un insieme di variabili indicative dell'evoluzione del sistema Enel trovano nei dati un effettivo riscontro: a tale riguardo il lavoro prende a riferimento una matrice di oltre 2000 dati (trentaquattro variabili per 56 anni). L'insieme delle variabili vengono suddivise in "famiglie" omogenee per contenuto d'informazione: Addetti, Energia venduta, Clienti, Reti, Ricavi, Investimenti, e a loro volta analizzate in maniera congiunta attraverso indicatori di rapporto, come quelli legati alla produttività del lavoro (Energia venduta/Addetti, Clienti/Addetti, ecc.), o relative alle caratteristiche del servizio di distribuzione dell'energia elettrica (Clienti/Rete, Rete/Addetti).*

E' nota la difficoltà implicita nel condurre studi empirici di questo tipo per comprendere i comportamenti spazio-temporali dell'evoluzione degli stati del sistema e in particolare per affrontare il carattere non lineare e l'interazione multifattoriale della dinamica di questi comportamenti. In generale la necessità di un approccio statistico multidimensionale e di ricerca dei punti di svolta del sistema, si scontra spesso nella difficoltà dovuta alla mancanza di disponibilità di dati (es. dati che non sono osservabili o rilevati (dark data) o ancora legata alla difficoltà di costituire una lunga serie di dati omogenei.

La finestra temporale analizzata comprende un lungo periodo dalla nazionalizzazione e quindi dalla nascita di Enel (1963) fino al 2018 (ultime rilevazioni omogenee disponibili) influenzati quindi anche dalla fase di liberalizzazione del mercato dell'energia e dal complesso processo strategico di internazionalizzazione del Gruppo.

La nostra serie è quindi rappresentata da una matrice multivariata che, per essere trattabile, richiede un'operazione di sintesi. Quest'ultima è stata svolta, mediante l'analisi in componenti principali (Principal component analysis o PCA), metodo ampiamente utilizzato negli studi sull'impresa, anche se con un'ottica sostanzialmente descrittiva su variabili statiche (Galbraith & Schendel, 1983; Pam & Thomas, 1990). Si noti che questo studio applica la PCA in modo dinamico, analizzando come le relazioni tra variabili evolvono nel tempo, superando il limite degli approcci statici menzionati in letteratura. La PCA è un algoritmo senza supervisione utilizzato per ridurre la dimensionalità di dati caratterizzate da molteplici variabili e osservazioni, incrementandole l'interpretabilità, minimizzando allo stesso tempo la perdita di informazioni (Jolliffe & Cadima, 2016). A questo fine vengono prima identificati i fattori, utilizzando la regola che nel complesso spieghino una varianza almeno superiore al 50%, soglia fissata per la validità convergente di costrutti (Tinsley & Brown, 2000). Nella PCA vengono individuati dei pesi (factor loading) che rappresentano come le singole variabili contribuiscono alla formazione dello specifico fattore o componente principale. Se i pesi hanno una magnitudine elevata,

normalmente superiore a 0.70, essi indicano che, a seconda del segno, la variabile influenza positivamente/negativamente e in modo significativo il determinato fattore (Kaiser, 1974).

L'analisi che descriviamo in questo lavoro implica che le variabili utilizzate non siano degli "a priori", che mantengono invariato il loro significato indipendentemente dal sistema studiato, ma, corrispondano invece a delle "sonde neutre". In questo senso ciò che ci appare come la stessa variabile, ad esempio 'investimenti totali', nel periodo pre-internazionalizzazione era un proxy di un impegno di modernizzazione e sviluppo industriale nel Paese, mentre dopo il 2002, la stessa variabile si trasforma in larga parte in una misura degli investimenti indirizzati a consolidare il processo di acquisizioni estere. Il cambiamento di significato 'in corsa' dovuto al cambiamento di contesto porterebbe a distorcere quindi l'intera analisi se si assumesse l'invarianza temporale di significato degli indici. Ad esempio se volessimo indagare la dinamica più recente di Enel mantenendo una continuità con il passato dovremo "passare di scala" e limitarci a quello che è accaduto in Italia.

Condurremo pertanto l'analisi seguendo due fasi: un primo lungo periodo storico: dalla nascita di Enel (1963) al 2002 a fare da spartiacque tra la fine degli effetti del processo di liberalizzazione dell'energia sul mercato italiano e l'avvio di una ampia strategia di acquisizioni internazionale, e una seconda fase che dal 2002 si spinge fino al 2018 (ultimi dati disponibili). Questo ci darà modo di analizzare da un diverso punto di vista la complessa dinamica vissuta dal sistema e più puntualmente associare ai possibili punti di svolta i fatti accaduti in un periodo di vita ultracinquantennale.

L'idea di fondo è che le singole variabili non siano altro che viste differenti dello stesso sistema, ci si attende, quindi, che i loro valori si muovano in sincronia nel periodo analizzato quando sottoposte a un parametro d'ordine che trascina il sistema nel suo insieme (e.g. sviluppo dell'azienda). In termini statistici, nell'ambito di questo comportamento corrisponde all'emergere di poche componenti principali in cui si raccoglie gran parte dell'informazione presente nel campo di dati. La mutua correlazione tra le variabili fa sì che l'informazione inizialmente dispersa nella n-upla delle variabili iniziali possa essere condensata in poche componenti che spiegano una parte rilevante dell'informazione globale del sistema, cioè una "maggior proporzione di varianza spiegata". Per questa loro caratteristica di massimizzazione della struttura di correlazione, le componenti ortogonali tra loro per costruzione, non sono altro che gli assi di un nuovo riferimento cartesiano (factor plane) e indicano le direzioni dello spazio delle fasi dove il sistema multidimensionale si correla maggiormente. La PCA è intesa pertanto come una rappresentazione relativistica, dove i posizionamenti nello spazio delle componenti dipendono dalla storia e dalle caratteristiche degli stessi dati esaminati. L'analisi fornisce semplicemente una "rilettura" statistica dei dati per una loro migliore comprensione, senza imporne scelte a priori, lasciando che ogni cosa emergesse dai dati in modo naturale. È in sintesi un cambio di prospettiva è quindi un modo per trarre il miglior aiuto nella interpretazione dei dati. Si noti che la PCA è sensibile alla scala delle variabili. Conseguentemente, per ridurre questo problema, le variabili sono state standardizzate sottraendo a ciascuna la propria media e dividendo il tutto per la deviazione standard.

Risultati. *I dati di Figura 2 mostrano tra l'altro i valori della varianza spiegata cumulativa (cumulative explained variance) al crescere del numero delle componenti estratte.*

Fig. 2: Analisi della varianza spiegata (limitata alle sole prime cinque componenti principali) riferita ai dati Enel relativi al periodo 1963-2002 (tavola a in alto) e al periodo 2002-2018 (tavola b in basso)

Varianza totale spiegata a) Periodo 1963-2002

	Autovalori iniziali			Caricamenti somme dei quadrati di estrazione		
Componente	Totale	% di varianza	% cumulativa	Totale	% di varianza	% cumulativa
1	15,523	70,557	70,557	15,523	70,557	70,557
2	5,139	23,357	93,915	5,139	23,357	93,915
3	0,734	3,337	97,251	0,734	3,337	97,251
4	0,244	1,108	98,359			
5	0,151	0,688	99,047			

Varianza totale spiegata b) Periodo 2002-2018

	Autovalori iniziali			Caricamenti somme dei quadrati di estrazione		
Componente	Totale	% di varianza	% cumulativa	Totale	% di varianza	% cumulativa
1	23,898	70,288	70,288	23,898	70,288	70,288
2	3,630	10,676	80,964	3,630	10,676	80,964
3	2,787	8,196	89,160	2,787	8,196	89,160
4	1,809	5,321	94,482			
5	0,565	1,660	96,142			

In particolare per il periodo 1963-2002 le prime tre componenti principali spiegano da sole già il 97,2% della variabilità totale del sistema nel primo periodo di analisi contro 89,2% del periodo 2002-2018. I due fattori spiegano una varianza che è ampiamente al di sopra della soglia del 50% che supporta la validità convergenze delle scale di misurazione (Hair et. al. 2019). Osserviamo ancora dal confronto delle due tabelle della varianza spiegata come mentre la prima componente conserva il suo peso esplicativo, la seconda componente si riduce di molto passando da 23,4% al

10,7%, al contrario della terza che si rafforza. Torneremo su queste prime osservazioni in avanti quando affronteremo le analisi di dettaglio Ciò che va considerato ancora è che una diminuzione di complessità del sistema porterà a una maggiore concentrazione della varianza su una sola o poche componenti principali, in questo caso è evidente come il periodo 2002-2018 ci rimandi l'immagine di una maggiore complessità (la prime tre componenti danno conto del 89% circa dell'informazione totale mentre nel periodo precedente spiegavano ben il 97% della variabilità totale.

Fig. 3: Matrice dei factor loadings: coefficienti di correlazione fra variabili originali e componenti (Factor). In tabella non indicati i valori della terza componente e solo ai fini di una migliore rappresentazione dei risultati le variabili maggiormente correlate per l'interpretazione dei fattori sono riportate in grassetto, mentre in corsivo quelle di media importanza.

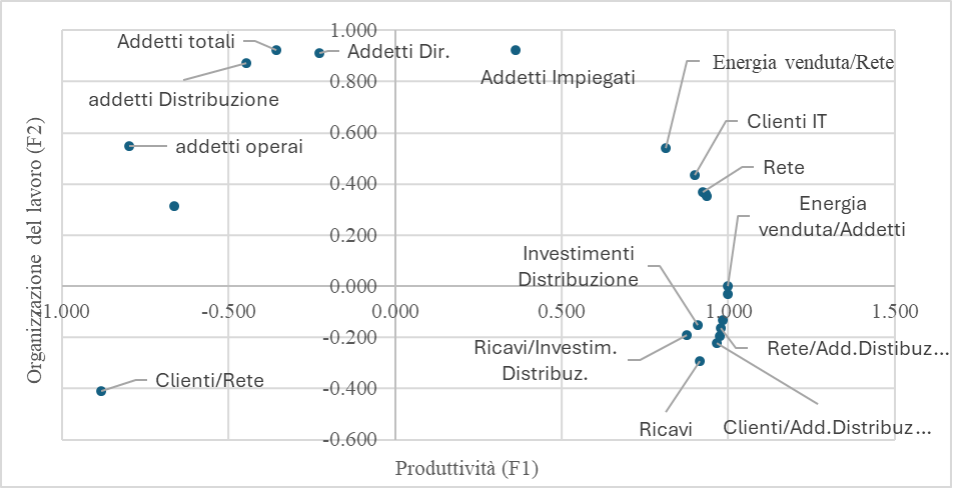
a) Periodo 1963-2002				b) Periodo 2002-2018		
Variabile	Factor 1	Factor 2		Variabile	Factor 1	Factor 2
Addetti dirigenti	-0,227	**0,910**		Addetti dirigenti	-0,102	**0,860**
Addetti Impiegati	0,360	**0,924**		Addetti Impiegati IT	**-0,952**	0,217
Addetti Operai	**-0,800**	*0,549*		Addetti Operai IT	**-0,966**	0,214
Addetti totali	-0,358	**0,922**		Addetti totali IT	**-0,951**	0,252
Addetti Distribuzione	-0,446	**0,872**		Addetti Distribuzione	**-0,953**	0,272
Energia venduta	**0,923**	0,367		Addetti Distribuzione / Addetti totali IT	**-0,929**	0,211
Energia venduta/Addetti totali	**0,998**	0,002		Energia venduta IT	**-0,930**	0,034
Energia venduta/Addetti Distribuzione	**0,998**	-0,031		Energia venduta Gruppo	**0,826**	-0,170
Clienti	**0,898**	0,436		Clienti IT	*-0,764*	*-0,623*
Clienti/Addetti totali	**0,975**	-0,195		Clienti Gruppo	**0,943**	-0,158
Clienti/Addetti Distribuzione	**0,964**	-0,223		Clienti IT/Addetti totali IT	**0,950**	-0,278
Rete linee MT	**0,935**	0,351		Clienti Gruppo/Addetti Gruppo	**0,979**	0,043
Rete linee BT	**0,931**	0,363		Clienti IT/Addetti Distribuzione	**0,967**	-0,241
Rete totale	**0,932**	0,360		Rete linee MT	**0,971**	0,211
Energia venduta/Rete totale	**0,814**	0,541		Rete linee BT	**0,979**	0,125
Clienti/Rete totale	**-0,884**	-0,410		Rete totale	**0,979**	0,145
Rete totale/Addetti Distribuzione	**0,976**	-0,162		Energia venduta IT/Rete totale	**-0,927**	0,033
Ricavi	**0,915**	-0,294		Clienti IT/Rete totale	**-0,882**	-0,456
Investimenti Distribuzione	**0,908**	-0,150		Rete totale/Addetti Gruppo	**0,993**	-0,005
Ricavi/Investimenti Distribuzione	**0,876**	-0,191		Rete totale/Addetti Distribuzione	**0,998**	-0,008
\\	\\	\\		Ricavi IT	**0,916**	0,315
\\	\\	\\		Ricavi Gruppo	**0,937**	0,298
\\	\\	\\		MOL Gruppo	**0,934**	0,295
\\	\\	\\		MOL Gruppo/Ricavi Gruppo	**-0,760**	0,250
\\	\\	\\		Investimenti Gruppo	**0,898**	0,394
\\	\\	\\		Investimenti Distribuzione	**0,781**	0,490
\\	\\	\\		Investimenti Gruppo/investimenti Distribuzione	**-0,826**	0,085
\\	\\	\\		Ricavi Gruppo/Investimenti Gruppo	***0,663***	-0,465

Esaminando meglio i risultati della matrice dei factor loadings (figura 3) si sottolinea come la prima componente principale F1 (70,7%) nella nostra interpretazione è da considerare come indice di efficienza. Ad esempio, il caricamento elevato di "Energia venduta/Addetti" (0,998) su F1 riflette un miglioramento nell'output per lavoratore, coerentemente con la riduzione degli operai (-0,800), suggerendo un passaggio a processi più efficienti, anche legati a una minore intensità di lavoro. In particolare mostra la crescita di efficienza attraverso i seguenti punti: a) Energia venduta/addetti (sia totali che Addetti area distribuzione) pari a 0,998: indici da mettere anche in relazione alla diminuzione degli operai (-0,800); b) Energia venduta /Rete (0,814) che assume ancora maggiore significatività se messa in relazione alla densità di rete per cliente (-0,884) e all'estensione della rete (0,932) oltre che all'aumento dei clienti (0,898); Clienti/Addetti Distribuzione (0,964) e vs. Addetti totali (0,975) da mettere in relazione all'aumento dei clienti. Infine si rileva una marcata correlazione con la variabile Ricavi/Investimenti Distribuzione pari a (0,876) correlati positivamente sia con i ricavi (0,915) che con gli investimenti in area Distribuzione (0,908).

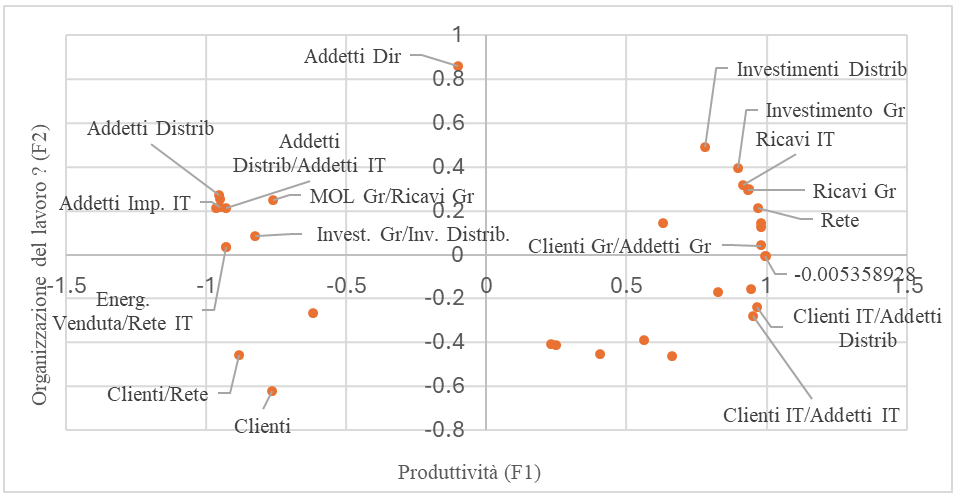
Per quanto riguarda la seconda componente F2 (23,3%) individuata come misura dell'organizzazione del lavoro si sottolineano le alte correlazioni con gli addetti sia impiegati totali (0,922) sia con gli Addetti relativi all'area Distribuzione (0,872); a queste indicazioni si aggiunge una notazione valida solo per gli operai che marcano con questa componente una minore correlazione (0,549). La terza componente, di "peso" decisamente trascurabile (3,33%) e quindi meno significativa, tanto da poter essere considerata come rumore di fondo della dinamica del sistema, si segnala solo la relazione con la variabile rapporto Addetti Distribuzione/Addetti totale (0,644).

Fig. 4: I due grafici illustrano le correlazioni nel primo piano fattoriale (F1-F2) riferiti al primo periodo di analisi 1963-2002 (riquadro in alto) e 2002-2028 (in basso). Inoltre per maggiore chiarezza espositiva sono descritte in chiaro le sole relazioni "forti", (>0,7).

a) Periodo 1963-2002



a) Periodo 2002-2018



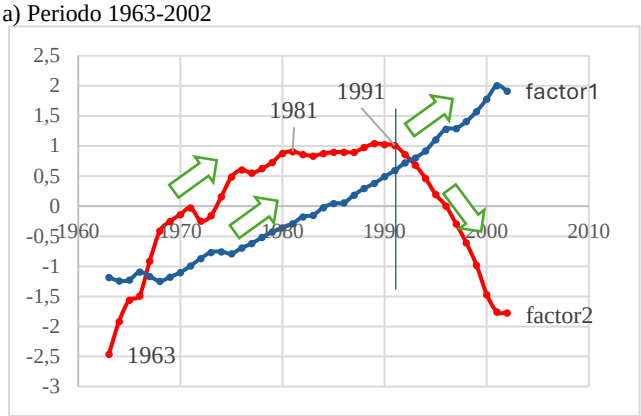
La nuova analisi riferita al periodo 2002-2018 riportata in Figura 3b, include nuove variabili per un totale di trentaquattro che comprendono i dati relativi alle acquisizioni estere e quindi consolidano i dati a livello di Gruppo. Ora come si può osservare dalla matrice dei factor loading la nuova prima componente rivela una caratteristica importante in quanto dalla sua interpretazione si riscontra quello che nella prima analisi era definita dai primi due fattori in modo indipendente e quindi ortogonali. Il tutto è reso maggiormente esplicativo attraverso l'analisi delle correlazioni nel primo piano fattoriale (F1-F2) riferiti al primo periodo di analisi 1963-2002 (riquadro in alto) e 2002-2028 (in basso) di Figura 4.

Da un rapido confronto dei due grafici si nota come nei due periodi le variabili correlate con la F1 con relazioni "forti" (> 0,7) suggeriscono di interpretare la stessa come sintesi della produttività aziendale per entrambi i periodi di analisi dati, mentre per quanto riguarda la seconda componente (F2) nel primo periodo viste le alte correlazioni con gli addetti si conferma come organizzazione del lavoro, mentre in questo secondo caso questa componente oltre a perdere di importanza (la sua varianza spiegata si riduce, passando da 23,4% al 10,67%) viene "assorbita" dalla F1; la nuova componente F2 ora diventa qualcos'altro. Sembra che l'organizzazione del lavoro messa così bene in evidenza nel primo periodo, con l'internazionalizzazione perde di intensità tanto da non essere più rilevata con una componente distinta. Infatti troviamo i valori relativi agli addetti sia su perimetro Italia che di Gruppo tutti con valori negativi nella prima componente. Ora i valori delle singole variabili della nuova prima componente si nota bene come si sono unificate in un unico flusso ma contrapposto. In particolare gli Addetti fortemente correlati con segno negativo, mentre in generale le variabili rapporto e quindi l'efficienza con segno opposto. Possiamo in sintesi osservare che il sistema pur dimensionalmente molto più grande da questa prospettiva di analisi è diventato più semplice e quindi anche più fragile. In ogni caso si ha dai dati la conferma che l'impresa è fortemente cambiata, si è ora in presenza di un sistema molto diverso dal precedente periodo che va dalla sua nascita al primo punto di svolta registrato intorno agli anni novanta

(1991) e successivamente intorno al 2002 a fare da spartiacque. Una ulteriore rappresentazione di quanto sopra osservato può essere più utilmente riscontrata negli andamenti delle prime due componenti principali (Factor1 in blu) e Factor 2 (in rosso) dell'analisi su macroscala degli indicatori riferiti al perimetro Italia (a sinistra) e fase di internazionalizzazione (grafico a destra) (Figura 5).

Fig. 5: Andamento dei punteggi (scores) delle prime due componenti principali (Factor1 in blu) e factor 2 (in rosso) dell'analisi su macroscala degli indicatori riferiti al perimetro Italia (a sinistra) e fase di internazionalizzazione (grafico a destra).

a) Periodo 1963-2002



b) Periodo 2002-2018

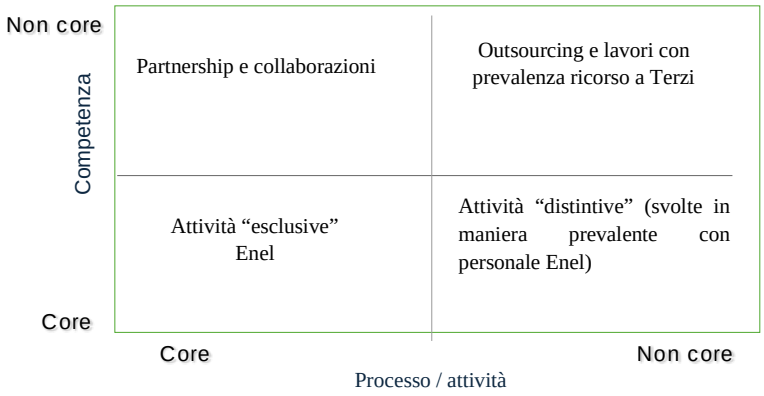
La Figura 5 mette bene in evidenza che i primi anni novanta (1990-1992) marca un equilibrio instabile del sistema, una "cima di collina" da cui il sistema inizia una storia differente. Questa caratteristica di 'cima' è evidente nel pannello di Figura 5 (grafico a sinistra) che mostra l'andamento della seconda componente principale dell'analisi su macro-scala (perimetro Italia) che, intorno al 1991, raggiunge un massimo per poi decrescere. Questa componente ha a che vedere con il numero degli addetti e quindi è esplicativa della dimensione e dell'organizzazione del lavoro; si nota bene, infatti, un valore elevato dei coefficienti di correlazione delle variabili che registrano il numero di addetti sulla componente stessa. Nel successivo periodo (2002-2018) (grafico di Figura 5 a destra) si riscontra ancora un punto di svolta, una valle intorno al 2008 dove i flussi si invertono. Ci si chiede cosa è successo nella realtà quegli anni: sono gli anni in cui s'innesca il disaccoppiamento tra la crescita dell'azienda in termini nella produttività del lavoro, crescita misurata dalla prima componente (Factor1), che mostra un andamento crescente nel tempo (curva in blu), e Factor2 che abbiamo già identificato in termini di organizzazione del lavoro (curva in rosso). La crescita di produttività continua mentre gli addetti diminuiscono. Si è insomma rotta la proporzionalità diretta tra crescita dei servizi e aumento degli addetti, per essere sostituita da un modello diverso sul quale indagheremo in avanti. Questa interpretazione è confermata dal fatto che la correlazione tra Factor1 (Efficienza) e Factor 2 (Organizzazione del lavoro) è positiva nel periodo 1963-1991 ed è negativa tra il 1992 e il 2002.

*Fig. 6: Correlazione tra fattori distinti per le due categorie A (1963-1991) e (1992-2002). Pearson Correlation Coefficients, N =29. Prob > r under H0: Rho= 0, with ** p<.001; * p<.05*

	primo periodo: 1963-1991 (29 valori)			secondo periodo: 1992-2002 (11 valori)		
	Factor1	*Factor2*	*Factor3*	*Factor1*	*Factor2*	*Factor3*
Factor1	1,000			1,000		
Factor2	0,803**	1,000		-0,992**	1,000	
Factor3	-0,140	*0,352*	1,000	0,685*	*-0,743***	1,000

Come evidenziato in Figura 6, le prime due componenti sono correlate positivamente nel primo periodo (r = 0,803) e negativamente nel secondo (r=-0,992), mentre globalmente sull'intero periodo sappiamo sono indipendenti per costruzione, e tutto ciò conferma in termini quantitativi l'esistenza di un punto di svolta, con una singolarità marcata intorno al 1991. Infatti, dal 1963 al 1991 la componente efficienza (Factor1) va nello stesso verso della componente dimensione (Factor2), mentre nel periodo successivo il trend si inverte con Factor1 che cresce e Factor2 che diminuisce. La cima di montagna messa in evidenza agli inizi degli anni novanta riflette in modo semplice un periodo di forte evoluzione dello scenario esterno connesso alla liberalizzazione del mercato dell'energia, di cui si richiamano solo alcune tappe importanti (dismissione da parte di Enel della sua capacità produttiva, cessazione delle reti di distribuzione in alcune grandi aree metropolitane, ecc..).

Fig. 7: Matrice "Processi/attività-competenze: schema di massima tra attività riservate all'interno per preservare esperienze e competenze acquisite e ricorso all'outsourcing.



In breve un insieme di azioni che andavano ad incidere negativamente sulle quote di mercato di Enel. Un rapido e brusco cambiamento che imponeva di confrontarsi con nuove regole di mercato e nuovi attori. Tutto ciò richiedeva una incisiva diversità di azioni strategiche-gestionali e operative come per esempio recuperare il gap esistente con le best practis delle maggiori utilities internazionali e concentrare le proprie risorse finanziarie e umane sui processi core e aprendo all'outosourcing (Figura 7). Il mutato quadro normativo, gli indirizzi sul livello di outsourcing, peraltro non facile da calibrare per le singole differenti situazioni sul territorio che si correlavano alla innovativa introduzione del contatore elettronico e della telegestione dei guasti e della misura, nonché la messa a punto di sistemi di telecontrollo della rete, nell'arco di pochi anni incidevano pesantemente sulle attività operative e quindi sul dimensionamento della risorsa personale.

Lo schema di massima di Figura 7 definisce dei quadranti solo a titolo di riferimento e pertanto non hanno una dimensione del "peso" delle singole macro-classificazioni di attività. Lo schema è comunque indicativo del fatto che i due quadranti inferiori considerati core in questa fase, perderanno progressivamente di consistenza a favore di un sempre maggiore ricorso all'esterno. Si è detto già in parte come il lungo periodo a sinistra della curva (1963-2002) è da associare al periodo di vita in regime di monopolio, ma che a ben conoscere la storia e i dati ci si accorge che non è stato affatto una fase stagnante e statica. Un periodo che ha attraversato una crisi petrolifera e finanziaria, intense azioni indirizzate al risanamento di bilancio (1982), continue riorganizzazioni territoriali alla ricerca di efficientamento di strutture e processi operativi, fino ad affrontare le sfide legate al mutare del contesto esterno (liberalizzazione del mercato dell'energia). Vedremo come la vetta raggiunta non offriva molto tempo per poter decidere con calma dove dirigersi. Incertezze e dubbi segnavano l'avvio di un vasto processo di espansione su scala globale con l'acquisizione di società estere anche di grandi dimensioni (es. Endesa). Ma ora aiutati dalla statistica proviamo ancora ad analizzare la dinamica di questa seconda fase storica di Enel. E bene tornare al grafico iniziale di figura 5 dove questo secondo periodo che giunge fino al 2018 (ultimi dati disponibili) mostra una rapida china conre ancora un punto di discontinuità e cambio di pendenza che intorno al 2008 riporta il sistema giù in fondo ad una valle forse per l'inizio di una nuova transizione.

Limiti. *Si è nel lavoro in più di una occasione sottolineato come il caso di studio ha un carattere di 'generazione di ipotesi' a partire dalla modifica dei pattern di correlazione emergenti dai dati e indici statistici legati a vari aspetti economici e organizzativi dell'azienda (quindi senza l'utilizzo di ipotesi a priori). I punti critici che emergono con l'analisi in modo naturale senza nessuna forzatura come variazioni della struttura di relazione di detti indici pongono naturalmente qualche riflessione. Ci si è mossi convinti del fatto che è il sistema (nel nostro caso ENEL) "che guida" ed è ancora lo stesso il luogo dove cercare e poi interrogarsi sulle ragioni di eventuali omogeneità o punti di svolta che emergono. Lo studio presentato vuole privilegiare il reale rispetto alla astrazione, "le leggi" in questo caso non esistono "a priori" ma sono "generate" dalle correlazioni particolari presenti e nascoste nei dati. Dunque, quanto presentato è solo qualcosa di limitato e non esauriente, ma sarebbe ugualmente sbagliato lavorare per frammenti disgiunti, frazionare i problemi, unidimensionalizzare ciò che non lo è.*

Implicazioni manageriali. L'idea di fondo dello studio è di comprendere meglio la dinamica evolutiva di un lungo periodo di vita *di un'impresa di grandi dimensioni e molto articolata (caso Enel). È emersa una storia che si è mossa in uno spazio multidimensionale che rileva una dinamica internamente molto auto-correlata. Poche componenti principali (Factor loading) hanno reso esplicativa una lunga storia misurata attraverso un grande numero di variabili che abbracciano i livelli occupazionali, le dimensioni del sistema industriale, volumi prodotti e bacini di utenza, stati economici-finanziari. Entrambe le fasi di analisi, come ci si attendeva, hanno messo in luce dinamiche non lineari con punti svolta che segnano per il sistema passaggi verso nuove transizioni. La modellizzazione statistica ex post è rafforzata dal fatto che quanto raccontato è accaduto davvero, ma ora la stessa segna il passo anche a causa della necessità di disporre di dati più recenti per poter comprendere e riconoscere in anticipo se siamo in prossimità di nuovi cambiamenti e passaggi critici. Ad esempio, il calo della correlazione tra componenti potrebbe segnalare l'insorgere di tensioni organizzative, richiedendo interventi proattivi per evitare crisi. In conclusione non resta che un invito ai responsabili e*

ai manager interessati di fare le mosse giuste strategiche e organizzative ponendo lo sguardo sull'emergere da future analisi di quei segnali deboli da tenere attenzionati e che potrebbero far sentire presto i propri effetti piccoli o molto intensi.

Originalità del paper. *Il lavoro propone un approccio di indagine multidimensionale della dinamica evolutiva di Enel e in particolare verificare se e in che misura questo approccio metodologico consente di fare emergere punti di discontinuità con cambiamenti di percorso del processo evolutivo e successivamente dalla conoscenza del sistema riuscire ad associare ad essi i reali fatti accaduti che in qualche misura hanno concorso a determinarli. Quello che interessa ancora sottolineare è come l'applicazione di un metodo tipico della chimica-fisica appena utilizzato (es. analisi delle transizioni di fase) possa far emergere qualcosa di interessante per lo studio delle organizzazioni e delle imprese, cioè portare allo scoperto come cambia la struttura di relazione del sistema ("la forma"), mentre le caratteristiche specifiche restano naturalmente legate al singolo caso.*

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Track 6
Marketing

From Table to Closet: Exploring Italian Consumers' Willingness to Embrace Food Waste Fashion

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Abstract

Food waste fashion represents a novel frontier in sustainable fashion, leveraging circular economy principles to convert food industry by-products - such as citrus peels, grape skins, or coffee grounds - into innovative textile fibres. This emergent domain offers a radical alternative to the dominant fast fashion model - characterised by mass production, short product lifecycles, and significant environmental degradation - which contributes disproportionately to water scarcity, carbon emissions, and textile waste, fuelling unsustainable consumption patterns. In contrast, food waste fashion reclaims organic residues, transforming them into value-added garments that align with both ecological goals and ethical consumption. Although this paradigm shift is gaining momentum in industry and media narratives, academic research remains scarce - particularly regarding consumer responses to outfits made from food-derived materials. Most existing studies prioritise technological innovation and environmental metrics, leaving a critical gap in understanding consumer attitudes, perceptions, and behavioural intentions. In particular, the emotional, symbolic, and moral dimensions of engaging with circular fashion alternatives remain underexplored. This study addresses this gap by investigating how Italian consumers perceive and evaluate fashion products made from food waste. Drawing on data collected through an online questionnaire, an Exploratory Factor Analysis (EFA) was employed to identify the latent components underlying consumer attitudes. Results provide preliminary insights into how sustainable values, novelty perception, and material-related concerns influence openness to food waste fashion. By capturing these dimensions, it seeks to contribute to the broader discourse on sustainable consumption and shed light on actionable managerial insights that shape public receptiveness to circular innovation in the fashion industry.

Framing of the research. *The increasing environmental impact of the global fashion industry has driven urgent calls for more sustainable and circular production models. Traditional and fast fashion systems - characterised by rapid production cycles, overconsumption, and high resource depletion - have become emblematic of unsustainable linear economies. According to Niinimäki et al. (2020), the fashion industry accounts for substantial water use, chemical pollution, and carbon emissions, with over 92 million tonnes of textile waste generated annually worldwide. Fast fashion, in particular, promotes disposability and excessive consumption, thereby intensifying ecological degradation and exacerbating social inequalities in global production networks (Niinimäki et al., 2020; Bick et al., 2018). In contrast, sustainable and circular fashion models aim to minimise environmental footprints, extend product life cycles, and valorise waste as a resource (Schiaroli et al., 2025). Within this evolving paradigm, food waste fashion has emerged as a novel innovation that exemplifies circular economy principles by transforming agricultural and food by-products - such as citrus peels, coffee grounds, or grape skins - into textile fibres and clothing. This approach not only diverts organic waste from landfill but also reduces reliance on virgin fibres and synthetic materials, thus responding simultaneously to challenges in the fashion and agri-food sectors (Chi, 2015; Jung and Jin, 2014; Provin and de Aguiar Dutra, 2021; Shen, 2014). For example, Orange Fiber, an Italian company producing fabric from citrus waste, collaborates with luxury fashion brands to create garments that merge environmental responsibility with aesthetic appeal, signalling a shift towards more regenerative material flows (Gain et al., 2024; Karaosman et al., 2020; Shen, 2014). These innovations are increasingly capturing the interest of both brands and consumers, particularly among younger demographics attuned to environmental and ethical concerns. A study by Joy et al. (2012) highlighted that Millennials and Gen Z consumers are more likely to express support for sustainable fashion initiatives, especially when they are perceived as authentic and aligned with personal values. However, actual purchasing behaviour often lags behind stated intentions - i.e., a*

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phenomenon widely referred to as the "attitude-behaviour gap" (McNeill and Moore, 2015). While many consumers report concern for environmental issues, decisions at the point of purchase continue to be driven by convenience, price, style, and perceived quality (Achabou and Dekhili, 2013). In the context of food waste fashion, this gap may be further exacerbated by unfamiliarity with materials, concerns about durability, or scepticism regarding the transformation of "waste" into fashion. As noted by Henninger et al. (2016), consumers often associate recycled or upcycled garments with lower quality or aesthetics, which can impede adoption despite favourable attitudes towards sustainability. Moreover, empirical studies specifically exploring consumer attitudes towards food waste-derived textiles remain limited. Although recent surveys have indicated high levels of openness towards fibres made from fruit waste among Italian consumers (Busalim et al., 2022; Hur and Cassidy, 2019), such findings are often based on small samples or exploratory frameworks and lack the analytical depth needed to capture the multidimensional nature of consumer perception. In addition, most studies tend to focus on broader categories like "sustainable fashion" or "eco-textiles", without disaggregating the nuances associated with different types of circular innovations, such as food waste-based garments (Thorisdottir et al., 2024). As a result, it emerges a clear gap in the literature: there is a need for more targeted, data-driven research that investigates consumer motivations, hesitations, and levels of awareness regarding food waste fashion. Furthermore, the Italian context remains underexplored, despite being a particularly relevant case: Italy not only holds a globally influential fashion industry, but also plays a significant role in agri-food production, including citrus and grape by-products used in textile innovation. The convergence of these two sectors makes Italian consumers especially relevant for studying the social acceptance of food waste fashion. To date, no large-scale empirical study has employed robust quantitative methods - such as Exploratory Factor Analysis (EFA) - to examine how consumers in Italy perceive, interpret, and engage with garments made from food by-products. Addressing this gap is critical for both academic and managerial purposes: understanding consumer attitudes can guide sustainable product development, enhance marketing strategies, and support policy measures aimed at promoting circular economy solutions.

Purpose of the paper. *In this context, this study aims to examine Italian consumers' awareness, perceptions, and behavioural inclinations toward food waste fashion as an innovative expression of circular and sustainable fashion. Specifically, the research investigates how sustainability values, openness to material innovation, and sensory-related expectations influence consumer acceptance of garments made from food industry by-products. For this purpose, the following three research questions were addressed:*

RQ1: What are the main drivers and barriers affecting Italian consumers' engagement with food waste fashion?

RQ2: How do sustainability values and innovation-oriented attitudes shape perceptions and adoption of garments made from food-based fibres?

RQ3: What role do digital platforms and brand communication play in fostering awareness and acceptance of food waste-based textiles?

The first research question aims to identify the psychological, ethical, aesthetic, and socio-economic factors that act as enablers or barriers in the decision-making process related to food waste fashion. These include motivations such as environmental concern, interest in innovation, or alignment with personal identity, as well as reservations regarding product quality, pricing, or unfamiliarity with the concept. The second question interrogates the relationship between sustainability-oriented dispositions and the cognitive evaluation of food waste-based clothing, with particular attention to the interplay between normative values and perceived product legitimacy. Finally, the third question puts consumer behaviour within its broader communicative and cultural context, assessing the influence of digital ecosystems - such as social networks, influencers, and sustainability-focused branding - on the normalisation and diffusion of such innovations. By addressing these questions, our study seeks to contribute to the academic discourse on sustainable consumption and provide practical guidance for brands, marketers, and policymakers aiming to support the market diffusion of circular fashion innovations.

Methodology. *To fulfil the research aims, the study employed a quantitative approach based on data collected through an online survey administered to Italian consumers. The primary aim of this study was to investigate consumer perceptions and attitudes towards food waste fashion, with a particular focus on the values, motivations, and potential barriers associated with the acceptance of garments made from food-derived materials. The online survey was designed based on existing academic literature on sustainable consumption, circular fashion, and green innovation adoption. Prior to data collection, a pre-test was conducted to refine the wording and structure of the questionnaire, ensuring conceptual clarity and internal consistency across all items. The final version of the questionnaire was distributed via Google Forms between August and September 2024. The survey included a combination of question formats: several items utilised a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), while others featured open-ended or multiple-choice responses. The data collection process resulted in 421 valid responses, providing a solid empirical foundation for subsequent analysis.*

The questionnaire was structured into four main sections, each designed to capture distinct dimensions of consumer behaviour, awareness, and attitudes towards sustainable fashion derived from food waste. The first section aimed to explore general purchasing behaviours related to clothing, including purchase frequency, the use of both online and offline channels, and the perceived influence of various factors on fashion choices. It also assessed participants' familiarity with the concept of sustainable fashion, a variable increasingly recognised in the literature as central to shaping environmentally responsible consumption (Niinimäki et al., 2020). The second section focused on consumers' knowledge and perceptions of sustainable textiles, such as linen and hemp, and extended this inquiry to the awareness of

garments made from food waste-based fibres. In line with prior research on material-based consumer preferences (Henninger et al., 2020), the section examined participants' willingness to purchase such products, the drivers behind these intentions, and the willingness to pay a premium for garments perceived as ecologically responsible. The third section investigated the role of social media and digital platforms in shaping knowledge and interest in sustainable fashion. Drawing on the growing body of work on digital consumer engagement and green marketing (McNeill and Venter, 2019), this part explored preferred communication channels, responsiveness to sustainability-focused content, and the role of branding and advertising in influencing consumer decision-making. Finally, the fourth section collected socio-demographic data - i.e., gender, age, region, education, occupation, household income, and family structure - to enable segmentation analysis and better understand sample heterogeneity across key variables known to influence sustainable consumption patterns.

Table 1: Sample composition

Gender	*Age*	*Education*	*Occupation*	*Income (€)*
Male, 39 Female, 60 Other, 1	18-25, 42 25-35, 38 36-50, 15 >50, 5	High school or below, 54 College or university, 43 Postgraduate, 3	Student, 29 Employed, 56 Self-employed or entrepreneur, 7 Retired or unemployed, 8	< 999, 33 1.000-1.999, 36 2.000-2.999, 15 ≥ 3.000, 16

Source: our elaboration.

Table 1 outlines the socio-demographic profile of the sample, offering insight into the diversity of respondents. Gender distribution shows a slight female majority, with 60% of women and 39% of men, while the remainder of the sample (1%) identified themselves as non-binary or preferred not to specify. In terms of age, the sample is primarily composed of young adults: 42% are aged 18-25 and 38% fall in the 25-35 range, making Millennials and Gen Z the predominant groups. Participants aged 36-50 represent 15%, while only 5% are over 50, reflecting a youthful profile aligned with the focus on emerging sustainable fashion trends. Educational levels are relatively high: 43% of the respondents hold a university degree and 3% have postgraduate qualifications, while the majority (54%) have completed secondary education or below. This indicates a varied educational background, with a considerable portion potentially still engaged in or recently completing their academic journey. From a professional standpoint, over half of the respondents are currently employed (56%), while 29% are students. A smaller share includes self-employed individuals or entrepreneurs (7%), and retirees or unemployed respondents (8%). This occupational mix reflects both early career stages and transitional employment statuses typical of younger cohorts. Income distribution is consistent with the overall profile. One-third (33%) report earning less than €999 monthly, 36% fall within the €1,000-1,999 range, and 15% report incomes between €2,000-2,999. Only 16% declare earnings of €3,000 or above. Notably, the sample is predominantly composed of respondents from the Italian Apulia region, which adds a valuable territorial dimension to the analysis. This regional concentration allows for a more nuanced understanding of local sustainability perceptions and may reflect specific cultural, social, and economic factors that shape consumer openness to circular fashion innovations such as food waste-based textiles. Overall, the sample reflects a predominantly young, moderately educated, and economically diverse population, thus offering a meaningful foundation for examining consumer perceptions and behaviours towards food waste fashion.

Results. *IBM SPSS Statistics was used to perform the Exploratory Factor Analysis (EFA), which enabled the identification of latent dimensions underlying Italian consumers' attitudes and behaviours towards food waste fashion (Abdi and Williams, 2010). The correlation analysis confirmed the significance of all variables in explaining the phenomenon, showing low, medium, and high positive values. To ensure the robustness of the analysis and verify the adequacy of the dataset, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO Test) and Bartlett's Test of Sphericity (BTS) were performed. It emerges that the KMO value exceeded the recommended threshold of 0.7 while the BTS significance level was below 0.05 (Table 2), thus confirming that the subgroups are adequate for further analysis.*

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,920
Bartlett's Test of Sphericity	Approx. Chi-Square	8540,67
	df	465
	Sig.	0

Source: our elaboration with IBM SPSS Statistics.

Subsequently, communalities were examined to assess the proportion of variance explained by the common factors. The results indicated satisfactory levels, with 67.33% of the total variance explained. Based on these values, six latent

factors were extracted, providing a clear structural interpretation of the underlying dimensions. Table 3 presents a summary of the extracted factors.

Table 3: Summary of the latent factors

	Latent factor	*Description*
1	*Value-Driven Sustainability Orientation*	This factor captures consumers' inclination to support food waste fashion based on ethical, environmental, and personal value systems. It reflects the importance attributed to sustainability certifications, environmental impact reduction, personal ethics, and transparency, as well as openness to technological innovation and alternatives to animal-based materials. The inclusion of variables such as storytelling and educational awareness suggests that consumers are motivated not only by environmental outcomes, but also by the communicative and symbolic dimensions of sustainability-oriented products.
2	*Sustainable Fashion Associations*	This factor reflects how consumers cognitively associate sustainable fashion with a set of core principles related to environmental, ethical, and transparency concerns. It encompasses the recognition of sustainable materials, responsible consumption practices, fair labour conditions, and the importance of eco-certifications and traceable supply chains. The factor suggests that for many consumers, sustainable fashion is defined not only by the final product but by the values embedded in its production process.
3	*Marketing Influence and Communication Levers*	This factor captures the impact of marketing communication on consumer decisions regarding sustainable fashion. It includes diverse promotional tools - such as social media content, limited edition collaborations, customer reviews, video campaigns, and sustainability disclosures - that shape consumer perceptions and purchasing behaviour. The presence of both experiential (e.g., events, storytelling) and informational (e.g., sustainability reports) elements suggests a multidimensional influence of marketing, where emotional engagement and transparency co-exist in reinforcing the appeal of sustainable fashion.
4	*Product Evaluation Criteria*	This factor encompasses the functional and aesthetic considerations that consumers apply when evaluating garments made from food waste-derived fibres. It includes perceived product quality, tactile and sensory attributes, visual appeal, and price sensitivity. These elements reflect the importance of conventional product expectations - such as comfort, design, and value for money - even in the context of sustainable innovation. The factor indicates that, beyond ethical motivations, consumers' adoption of food waste fashion is also strongly influenced by tangible product performance.
5	*Material Sophistication Orientation*	This factor reflects consumers' sensitivity to the nature and quality of fabrics when making purchasing decisions. It captures the appeal of both refined and innovative textiles, suggesting that certain consumer segments value originality, technical advancement, and exclusivity in material composition. The factor implies that fabric characteristics are not merely functional, but contribute to the symbolic and experiential value of fashion products.
6	*Purchase Intention and Willingness to Pay*	This factor captures the consumer's overall propensity to adopt food waste fashion, encompassing both behavioural intention and economic commitment. It reflects a positive disposition toward purchasing garments made from food-derived fibres, as well as a willingness to pay a price premium for such sustainable alternatives. The factor signals a concrete level of engagement that moves beyond attitudes to action-oriented readiness.

Source: our elaboration with IBM SPSS Statistics

The first factor - named "Value-Driven Sustainability Orientation" - emerged as the most comprehensive, bringing together variables linked to ethical values, environmental concern, transparency, innovation, and personal beliefs. It highlights that consumers are deeply influenced by non-material motivations when evaluating garments made from food waste-derived fibres. In particular, they appear to be guided by a coherent set of sustainability-oriented values, including a preference for ethical production, support for environmental certifications, and interest in storytelling and technological innovation. The second component further strengthens this interpretation by showing how consumers cognitively associate sustainable fashion with specific principles, such as fair labour, transparency, responsible consumption, and eco-friendly materials. The strong presence of this dimension suggests that consumers tend to project a holistic view of sustainability onto food waste fashion as well, extending their general understanding of sustainable fashion to this more specific innovation. "Marketing Influence and Communication Levers" factor emerged as third. It addresses the role of external stimuli - such as social media, advertising, events, and promotional content - in shaping consumer decisions. This dimension captures the effectiveness of both emotional and informational marketing strategies, including the relevance of sustainability disclosures and the persuasive power of influencers and brand storytelling. As a result, digital communication plays a strategic role in normalising and promoting food waste fashion, particularly among younger and more digitally engaged consumers. The fourth factor - i.e., "Product Evaluation Criteria" - reflects a more pragmatic dimension of consumer judgement. It includes variables such as product price, aesthetic appeal, sensory characteristics, and perceived quality. It reveals that while ethical and sustainability motivations are significant, consumers also evaluate food waste fashion through conventional lenses. Concerns about price competitiveness, fabric performance, and design coherence remain central. Even environmentally conscious consumers may hesitate if they perceive that a garment does not meet their expectations in terms of comfort, look, or durability. The fifth factor - i.e., "Material Sophistication Orientation" - suggests that fabric selection is not only a technical consideration but also a marker of innovation, exclusivity, and identity. Respondents highlight a preference for refined or cutting-edge textiles, potentially indicating a niche market for food waste fashion when positioned as a high-value, design-forward solution. Finally, "Purchase Intention and Willingness to Pay" component offers a behavioural synthesis of the previous constructs. It captures the readiness of consumers to actively support food waste fashion, both through their willingness to try such garments and their openness to paying a higher price. This dimension signals a shift from attitudinal agreement to actionable commitment.

Our findings paint a nuanced and multidimensional picture of how consumers engage with food waste fashion, revealing the complex interplay between individual values, product expectations, and communication dynamics. Consumers are primarily motivated by ethical and environmental convictions, which operate not as abstract ideals but

as concrete evaluative lenses through which they assess the legitimacy and desirability of sustainable garments. At the same time, interest in innovation and material quality contributes to shaping positive perceptions, particularly when the product is seen as both responsible and aesthetically appealing. However, this value-driven orientation coexists with more pragmatic concerns: doubts about fabric performance, limited familiarity with food-derived textiles, and sensitivity to pricing may hinder broader adoption. Digital communication emerges as a key enabler in this landscape, with social media, sustainability storytelling, and promotional content playing an active role in raising awareness, building trust, and framing food waste fashion as both credible and aspirational. Altogether, the six latent dimensions identified suggest that consumers' acceptance of food waste-based textiles depends on the convergence of personal convictions, tangible product qualities, and effective communication - highlighting the need for integrated strategies that align sustainability values with compelling market offerings.

Research limitations. *This study is not without limitations. The sample does not fully represent the broader Italian population, with an overrepresentation of respondents from the Apulian region. While self-reported data may be subject to social desirability bias, it nonetheless provides a valuable foundation for further exploration of Italians' sustainable consumption behaviours in the fashion industry.*

Managerial implications. *This study offers relevant insights for fashion brands, start-ups, and sustainable textile innovators seeking to promote food waste fashion within the circular economy. Results indicate that a mix of value-driven and product-related motivations influences consumers. To enhance engagement, companies should communicate the ethical, environmental, and innovative aspects of food waste-based garments through transparent messaging, certifications, and compelling storytelling, while also ensuring high standards of quality, aesthetics, and sensory appeal. Marketing strategies should highlight ethical production, environmental benefits, traceability, uniqueness, performance, and contemporary appeal of food-derived fibres. Furthermore, given the strategic role of digital communication, social media and online platforms appears pivotal in delivering engaging and informative content. Limited editions, designer collaborations, and experiential initiatives can further increase the perceived value and originality of these garments.*

Originality of the paper. *This study advances the literature on circular fashion by investigating consumer responses to food waste-based textiles - an area still largely underexplored. By focusing on Italian consumers, it reveals how sustainability values, product perceptions, and digital communication jointly influence acceptance of garments made from food by-products. Moreover, the use of Exploratory Factor Analysis offers a structured view of the underlying motivational and perceptual dimensions, offering a foundation for future research on consumer engagement in this context.*

Key words: *Food waste fashion; sustainable fashion; circular economy; sustainable consumption; consumer behaviour.*

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Vintage Vibes or Trendy Thrift? Unveiling Generational Shifts in Second-Hand Fashion Consumption Among Early and Late Gen Z

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Abstract

The rising environmental and social awareness surrounding fast fashion's unsustainable practices has contributed to the growing popularity of second-hand clothing, particularly among younger consumers. Within this context, Generation Z - i.e., individuals born between 1996 and 2012 - has emerged as critical due to its strong values related to sustainability, digital fluency, and a redefinition of consumption to express personal and ethical beliefs. Gen Z's purchasing choices, indeed, increasingly reflect concerns for environmental impact, circular economy models, and authenticity. Existing literature recognises these consumers as pivotal actors in the transition towards sustainable consumption. However, most contributions are either global or Western-centric, with limited empirical insight into the Italian context. Moreover, few studies investigate internal generational differences, such as those between early and late Gen Z, in relation to second-hand fashion practices. Therefore, this research aims to address these gaps by examining how sustainability values influence second-hand fashion consumption among Italian Gen Z, and how motivations, behaviours, and perceived barriers vary across generational subgroups. Based on data from an online questionnaire administered to 428 participants, this study employs an Exploratory Factor Analysis (EFA) to identify key behavioural drivers. Preliminary findings reveal that sustainability, uniqueness, and identity construction are primary motivations for engaging in second-hand fashion, with digital platforms such as Vinted and Depop playing a decisive role. Early Gen Z shows stronger attention to sustainability and product quality, whereas late Gen Z emphasises individual style and diversified purchasing channels. These insights offer practical implications for fashion brands and policymakers promoting responsible and circular consumption.

Framing of the research. *In the contemporary socio-economic landscape, sustainability has evolved from a peripheral concern to a central element in shaping institutional strategies and individual consumption behaviour. On the one hand, businesses adopt ESG frameworks, sustainability certifications, and circular product design models, while governments implement policies such as green public procurement, mandatory sustainability reporting, and incentives for environmentally responsible innovation (Becchetti et al., 2022). On the other hand, individual consumers contribute to advancing circular economy principles and ethical responsibility through their choices, such as opting for second-hand clothing, favouring ethical brands, reducing waste, or using digital re-commerce platforms. In this way, their behaviour becomes an active vehicle for systemic change, reinforcing sustainability across the entire value chain (Calvo-Porral and Viejo-Fernández, 2025; Machado et al., 2019).*

Among the most engaged demographic cohorts, Generation Z (i.e., those individuals born between 1996 and 2012) has emerged as a key driver of this cultural transformation. Unlike previous generations, it has grown up in an era of digital saturation, climate anxiety, and global economic instability. This exposure has shaped a generation characterised by high digital literacy, entrepreneurial attitudes, and strong ethical awareness (Seemiller and Grace, 2018). Gen Z's consumption behaviour is defined by a unique combination of individualistic self-expression and collective responsibility, where values such as transparency, equity, environmental protection, and social justice are prioritised in their purchasing decisions (Dorsey and Villa, 2020; Fromm and Read, 2018). These values are particularly expressed in the second-hand fashion sector. Historically associated with economic necessity or subcultural resistance (Frank, 1997; Romano, 2017), this market has undergone a significant transformation till being perceived as a credible alternative to fast fashion - i.e., an industry criticised for its high environmental impact, resource exploitation, and unsustainable production cycles (Mokyr, 1990; Bocken et al., 2014). The renewed popularity of second-hand fashion is driven not only by sustainability concerns but also by aesthetic motivations (such as uniqueness and vintage appeal), identity construction, and digital accessibility.

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Digital platforms - such as Vinted, Depop, and Vestiaire Collective - have been influential in democratising access to second-hand clothing. They have enabled user-friendly re-commerce experiences, increased the perceived legitimacy of used items, and supported peer-to-peer models of exchange that resonate with Gen Z's preference for participatory, decentralised systems (Epifani, 2020; Tovar et al., 2023). Simultaneously, the power of social media influencers and communities has normalised second-hand consumption, positioning it as both environmentally responsible and fashionable. Influencers like Kristina Bazan and Kaitlyn Ham, for example, have helped reframe second-hand fashion as a lifestyle choice aligned with values of individuality and eco-consciousness (Djafarova and Foots, 2022).

From a psychological and cultural perspective, their behaviour is also shaped by complex motivational factors. Studies suggest that identity, social belonging, and perceived behavioural control play a significant role in determining sustainable choices (Ek Styvén and Mariani, 2020; Gilal et al., 2024; Gupta and Ogden, 2009; Koay et al., 2022). The theory of planned behaviour and the S-O-R model support the notion that external stimuli (e.g., social media content) influence internal states (e.g., attitudes, values), which in turn drive behavioural outcomes. In this context, Gen Z's engagement with second-hand fashion can be seen as an active, self-aware practice aimed at constructing a coherent identity that aligns with their ethical beliefs and social expectations (Busalim et al., 2022; Xiao et al., 2023).

While ethical and sustainable consumption has become an increasingly prominent focus in academic discourse, the literature continues to exhibit significant blind spots. Much of the existing research is rooted in Anglo-American or globalised frameworks, often neglecting the cultural specificity of national contexts such as Italy - a country where fashion holds deep economic and symbolic relevance. Although Generation Z is widely acknowledged for its strong ethical orientation and environmental awareness, empirical investigations rarely examine how these values are actually put into practice in the second-hand fashion domain. Even more overlooked is the internal heterogeneity of Gen Z itself. The behavioural distinctions between early and late cohorts - shaped by diverse socio-cultural exposures and digital experiences - remain largely unexplored (Balon, 2024). This limits our ability to grasp the full complexity of their sustainable consumption behaviours. Moreover, while previous studies have highlighted the powerful influence of peer dynamics and social norms on Gen Z's decision-making (Dabija et al., 2019; McDonald and Oates, 2006), little attention has been paid to how these social forces intersect with digital ecosystems. Re-commerce platforms and social media networks not only enable second-hand transactions, but also function as cultural arenas where sustainability values are constructed, shared, and reinforced. At the same time, structural and perceptual barriers - such as concerns about hygiene, trust in online sellers, or the time investment needed to find quality items - continue to limit engagement in second-hand markets (Casalegno et al., 2022; Wood, 2013). Addressing these frictions is crucial for designing effective interventions and communication strategies.

As a result, this research addresses these gaps by adopting an interdisciplinary framework that combines theories from marketing, sustainability, consumer psychology, and digital innovation. Through the lens of the Italian context, it examines how Gen Z navigates the symbolic, functional, and ethical dimensions of second-hand fashion. By analysing the drivers, values, and digital environments that shape second-hand fashion consumption among Italian Gen Z, this study contributes to a deeper understanding of how sustainability is internalised, enacted, and negotiated by a digitally native, value-driven generation. In doing so, it positions second-hand fashion not merely as a consumption trend, but as a structural shift in the way goods are valued, exchanged, and experienced in a changing cultural and ecological landscape.

Purpose of the paper. *Against this background, the present study aims to investigate how sustainability values influence second-hand fashion consumption among Italian Generation Z consumers, shedding light on the motivational, behavioural, and cultural dynamics that underpin this trend. To achieve this, the study addresses the following three research questions:*

RQ1: What are the key factors driving second-hand fashion consumption among Italian Gen Z consumers?
RQ2: How do sustainability values shape Gen Z's perception and adoption of second-hand fashion?
RQ3: What role do digital platforms and social media play in facilitating and reinforcing sustainable fashion choices among Gen Z?

The first research question focuses on identifying the main drivers - such as economic, ethical, aesthetic, and social - that guide Gen Z's second-hand purchasing behaviour. The second question explores the extent to which sustainability-related considerations, such as environmental impact reduction, ethical production, and circular economy awareness, influence these decisions. The third question analyses the digital ecosystem in which this behaviour occurs, evaluating how online platforms and social influencers contribute to normalising and promoting second-hand consumption. By addressing these questions, our study seeks to offer theoretical and practical contributions for fashion brands, digital retailers, and policymakers aiming to engage younger consumers in sustainable consumption models.

Methodology. *To address the research objectives, this study adopted a quantitative methodology using data from an online questionnaire targeting Italian consumers belonging to Generation Z. The primary goal was to explore the relationship between sustainability values and second-hand fashion consumption, investigating the motivations, behavioural patterns, and perceived obstacles that characterise this practice among digitally native and ethically engaged youth. The survey was constructed according to relevant academic literature on sustainable consumption, Gen Z behaviour, and second-hand fashion practices. Before launching data collection, a pre-test was conducted to refine the wording and structure of the questionnaire, ensuring clarity and consistency across all items. The final version of the questionnaire was disseminated through Google Forms from October to December 2024. To measure responses, some*

questions provided a seven-point Likert scale evaluation - with '1' and '7' representing low or high matches, respectively - while other questions employed open or multiple-choice answers. The data collection process yielded a total of 428 valid responses from participants who met the age criteria for Generation Z, offering a robust empirical base for the analysis.

The questionnaire was designed to capture multiple dimensions of consumer behaviour and perception. Participants were first asked to assess their general knowledge and personal importance of sustainability, covering environmental, social, and economic aspects. Subsequent sections investigated purchasing patterns specific to second-hand fashion, including frequency of purchase, preferred channels (both digital and physical), and motivations underpinning these choices. Particular attention was devoted to understanding how sustainability-related values - such as environmental concern, ethical awareness, and identity expression - influence consumers' attitudes towards second-hand clothing. Moreover, the survey explored the influence of social networks, peer groups, and digital platforms on purchasing behaviour - reflecting the increasingly hybrid nature of fashion consumption in Gen Z - as well as possible barriers (i.e., lack of trust in product quality, hygiene concerns, or time constraints) and incentives (i.e., affordability, uniqueness of items, or alignment with community values) to second-hand shopping. Finally, socio-demographic data were collected to allow for segmentation analysis and to assess the internal diversity of the sample in terms of age range, gender, education level, income, and occupation.

Table 1: Sample composition

Gender	*Age*	*Education*	*Occupation*	*Income (€)*
Male, 46.5 Female, 53 Other, 0.5	18-22, 53 23-28, 47	High school or below, 30 College or university, 67 Postgraduate, 3	Student, 51 Employed, 25 Self-employed or entrepreneur, 9 Unemployed, 15	None, 49 < 999, 22 1.000-1.999, 28 ≥ 2.000, 1

Source: our elaboration.

Table 1 summarises the respondents' socio-demographic profile. The gender distribution was relatively balanced, with a slight female majority (53.3%) compared to males (46.5%) and a minimal proportion of respondents who preferred not to declare their gender (0.2%). Regarding age, early Gen Z participants were the most represented group in the sample (53%) while late Gen Z participants accounted for 47%. Educational attainment was notably high: 41.8% held a bachelor's degree, 25.5% had completed a master's degree, and 18.7% had a high school diploma. A smaller segment reported other forms of education, including upper secondary or professional qualifications. Occupationally, the sample reflected the transitional nature of Gen Z's entry into the workforce: 50.9% identified as students, 25.2% were employees, 15% were job seekers, while smaller groups included freelancers (5.1%) and those engaged in other or undeclared work (2.6%). As expected, income levels were generally modest. Nearly half of the respondents (48.6%) reported having no income, 22.2% earned less than €1,000 per month, and 27.8% had monthly earnings between €1,000 and €2,000. Only a small minority (1.4%) reported incomes exceeding €2,000. These figures align with the student-heavy composition of the sample and the early career stage of many participants. Overall, this demographic profile offers a reliable and representative foundation for analysing second-hand fashion consumption and sustainability values among Italian Gen Z, with particular attention to the behavioural differences emerging across subgroups based on age, income, and education.

Results. *IBM SPSS Statistics was used to perform the Exploratory Factor Analysis (EFA), which helped us to identify the latent factors underneath the consumer behaviour of Italians when purchasing products from e-commerce platforms (Abdi and Williams, 2010). To deepen the understanding of the motivational dynamics and perceptions related to second-hand fashion consumption, the sample was divided into two generational subgroups: Early Gen Z (born approximately between 1997 and 2001) and Late Gen Z (born between 2002 and 2006). Although both belong to the same generational cohort, their differing formative experiences and socio-cultural contexts may have shaped distinct attitudes toward sustainability and second-hand purchasing. This segmentation allows for a more nuanced interpretation of the Exploratory Factor Analysis (EFA) results, highlighting not only overall trends within Generation Z but also internal variations.*

Table 2: KMO and Bartlett's Test

Early Gen Z		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,932
Bartlett's Test of Sphericity	Approx. Chi-Square	9380,74
	df	703
	Sig.	<,001

Late Gen Z		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,856
Bartlett's Test of Sphericity	Approx. Chi-Square	14342,07
	df	666
	Sig.	<,001

Source: our elaboration with IBM SPSS Statistics.

The correlation analysis confirmed the significance of all variables in explaining the phenomenon for both generational subgroups, showing low, medium, and high positive values. To ensure the robustness of the analysis and verify the adequacy of the two datasets, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO Test) and Bartlett's Test of Sphericity (BTS) were performed. In both cases, the KMO value exceeded the recommended threshold of 0.7 and the BTS significance level was below 0.05 (Table 2), thus confirming that the subgroups are adequate for further analysis.

Subsequently, communalities were examined to assess the proportion of variance explained by the common factors. The results indicated satisfactory levels, with 75.10% of the total variance explained for the Early Gen Z subgroup and 82.70% for the Late Gen Z subgroup. Based on these values, six latent factors were extracted for Early Gen Z and four for Late Gen Z, providing a clear structural interpretation of the underlying dimensions. A summary of the extracted factors is presented in Table 3.

Table 3: Summary of the latent factors

Early Gen Z		
	Latent factor	*Description*
1	*Motivations for Second-hand Purchase*	Represents the main drivers behind Early Gen Z's interest in second-hand fashion. It highlights the search for an aesthetic linked to sustainability and originality, with attention to the practical benefits of second-hand purchasing.
2	*Quality and Origin of Second-hand Items*	Reflects Early Gen Z's concern for the quality, origin, and brand reputation of purchased items. It includes variables related to trust in product characteristics and economic savings.
3	*Purchase Decision and Trust*	Emphasises the role of trust in the purchasing process. Decisions are influenced by seller reputation, user reviews, and perceived product quality based on available images and information.
4	*Alternative Purchasing Channels*	Refers to second-hand purchasing methods beyond mainstream platforms like Vinted. It captures the importance of availability, convenience, and affordability in the shopping experience.
5	*Community and Sharing*	Explores the relationship between the sense of belonging to a community, individualistic motivations, and the sample's socio-demographic features. It includes variables related to age and gender.
6	*Income*	Represents the economic capacity and mindful purchasing behaviour of Early Gen Z, with a focus on managing limited financial resources.

Late Gen Z		
	Latent factor	*Description*
1	*Motivations for Second-hand Purchase*	Represents the main purchasing motivations of Late Gen Z. It highlights personal identity construction, perceived quality, and a strong connection to sustainability and authenticity through second-hand fashion.
2	*Purchasing Methods*	Refers to more traditional shopping formats, such as flea markets and physical stores. It reflects Late Gen Z's renewed interest in tangible, in-person second-hand shopping experiences.
3	*Sustainability and Alternative Channels*	Emphasises the role of digital and alternative platforms in second-hand purchases, linked to values such as sustainability, convenience, and uniqueness in product selection.
4	*Gender*	Dominated by the socio-demographic variable of gender. The predominance of male respondents suggests potential gender-based differences in second-hand fashion interest and purchasing behaviour.

Source: our elaboration with IBM SPSS Statistics

The analysis revealed distinct behavioural patterns between the two subgroups of Generation Z, offering a nuanced perspective on second-hand fashion consumption. Among Early Gen Z, six latent factors emerged, suggesting a more complex and articulated motivational structure. The dominant factor reflects a multidimensional set of drivers, combining sustainability awareness, aesthetic expression, and practical considerations - consistent with previous research highlighting this group's tendency to align values with consumption choices (Dorsey and Villa, 2020; Fromm and Read, 2018). Other salient factors include attention to product quality and origin, reflecting concerns for transparency and durability (Jakubowska et al., 2024), and trust in the purchasing process, influenced by seller reputation and peer reviews - i.e., elements that align with Gen Z's strong reliance on social proof in digital environments (McDonald and Oates, 2006). Additionally, Early Gen Z displayed sensitivity to alternative purchasing channels, beyond major re-commerce platforms, indicating a search for flexibility and convenience. The emergence of community and value-sharing as a distinct factor suggests a partial orientation toward collective identity and shared ethics, though moderated by individualistic traits. The income-related factor further points to the role of limited financial resources in shaping thoughtful, budget-conscious decision-making.

In contrast, Late Gen Z presented a more streamlined structure, with four latent factors explaining a higher percentage of variance. Here, identity construction and authenticity emerged as dominant themes in second-hand fashion motivations, aligning with recent studies that describe younger Gen Z as highly self-expressive and individualistic in their consumption (Djafarova and Foots, 2022). Unlike their older peers, this subgroup showed a renewed appreciation for traditional shopping experiences, such as physical thrift stores and flea markets—potentially as a form of resistance to digital saturation and a search for tangible, curated experiences. While sustainability remained a central value, Late Gen Z's approach appears more intertwined with alternative and digital channels, combining ethical commitment with the

search for uniqueness and practicality. Notably, gender emerged as a distinct factor, with male participants playing a more active role, possibly signalling shifting gender dynamics in sustainable fashion engagement (Balon, 2024).

Overall, these findings confirm that Generation Z is far from monolithic. Early Gen Z tends to exhibit a more structured and socially influenced pattern of consumption, driven by ethical awareness, trust, and community, while Late Gen Z leans toward individualistic, identity-based motivations, shaped by hybrid shopping habits and emerging values. These insights not only reinforce the importance of internal generational segmentation (Schaefer and Crane, 2005), but also provide actionable guidance for brands and policymakers aiming to foster sustainable behaviour through tailored strategies and messaging.

Research limitations. *This study is not without limitations. The sample does not fully represent the broader Italian Gen Z population, with an overrepresentation of respondents from Southern Italy. Self-reported data may also be influenced by social desirability bias. Nonetheless, these findings offer a meaningful starting point for deeper investigations into Gen Z's sustainable consumption behaviours.*

Managerial implications. *This study provides valuable insights for fashion retailers, re-commerce platforms, and sustainability-oriented brands seeking to better engage Generation Z consumers in the second-hand fashion market. Our findings underline the importance of recognising intra-generational differences within Gen Z - particularly between Early and Late cohorts - when designing communication strategies, product offerings, and user experiences. For Early Gen Z, marketing efforts should emphasise the ethical and collective dimensions of sustainable consumption, including transparency, product origin, and community values. Trust-building elements such as detailed product information, verified seller reputations, and sustainability certifications may enhance perceived reliability and encourage purchase. In contrast, Late Gen Z appears more responsive to messaging focused on individual identity, authenticity, and uniqueness. Brands targeting this segment should highlight the expressive potential of second-hand fashion, promote curated and distinctive items, and offer hybrid experiences that blend digital convenience with physical discovery (e.g., pop-up thrift events, collaborations with content creators). Moreover, both segments value digital platforms as key enablers of sustainable fashion access. Re-commerce businesses can leverage this by enhancing platform usability, offering personalised recommendations, and promoting sustainability-driven narratives across social media. Overall, the study suggests that tailoring strategies to the motivational and behavioural nuances within Gen Z can strengthen consumer engagement, support circular economy practices, and build long-term brand loyalty. Companies that understand and adapt to these differences will be better positioned to lead the shift toward more conscious, value-driven consumption models.*

Originality of the paper. *This study offers a novel contribution to how sustainability values influence second-hand fashion consumption among Italian Generation Z consumers. This study uniquely differentiates between early and late Gen Z cohorts, uncovering intra-generational differences often overlooked in existing literature. By combining sustainability, identity expression, and digital engagement within the specific context of second-hand fashion, the research fills a significant gap in the literature and provides new insights for academics, practitioners, and policymakers interested in sustainable consumption and youth-driven market transformation. As a first step in this direction, our study provides a solid foundation for future research aiming to deepen understanding of youth-led sustainable consumption and the growing relevance of second-hand fashion within circular economy models.*

Key words: *Generation Z; fast fashion; second-hand fashion; sustainable consumption; consumer behaviour.*

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Towards an Integrated Winescape Framework: a theoretical synthesis in Wine Tourism research

VALENTINA CASCIO[1]

Abstract

The concept of winescape has emerged as a pivotal framework in wine tourism research, encompassing the physical, cultural, and experiential elements that shape tourists' perceptions of wine destinations. While previous studies have explored various dimensions of winescape, the lack of a unified theoretical model has limited its applicability across different contexts. This paper aims to bridge this gap by conducting a literature review and a systematic meta-analysis of 43 studies, leading to the development of an Integrated Winescape Framework (IWF). The framework synthesizes five primary dimensions: physical winescape (landscape, architecture, accessibility), cultural and historical winescape (terroir, storytelling, local community), sensory and experiential winescape (multisensory engagement, emotional impact), economic and marketing winescape (branding, value-added services, digital integration), and behavioral and psychological winescape (consumer behavior, loyalty, social influence). By integrating these dimensions, the IWF aims to provide a structured template for understanding how winescape influences tourist decision-making, destination attractiveness, and consumer engagement. The study highlights the strategic role of winescape in tourism development and branding, offering insights for both academia and industry practitioners. Future research should focus on empirical validation of the model and explore the underexamined role of winery architecture in shaping visitor experiences.

Framing of the research

1. The genesis of the term 'Winescape'

The concept of winescape originates from the broader theoretical framework of servicescape, a term introduced by Bitner (1992) to describe the physical environment in which a service is delivered and its impact on customer behavior. Servicescape encompasses three principal dimensions: ambient conditions, spatial layout and functionality, and symbolic artifacts. Given its significance in shaping consumer experiences in hospitality and tourism, the servicescape framework has been applied to various industries, leading to adaptations such as festivalscape (Lee et al., 2008), shipscape (Kwortnik, 2008), and ultimately winescape. The term winescape was first introduced by Peters (1997) and later expanded upon by Hall et al. (2002) and Johnson and Bruwer (2007). Hall et al. (2002) broadly defined winescape as the "attributes of a grape wine region," emphasizing its role in shaping visitor perceptions and experiences. Johnson and Bruwer (2007), in one of the most widely cited definitions, described winescape as "the interplay of multiple tangible and intangible elements, including vineyards, wineries, the surrounding physical structures, wines, natural landscapes, cultural heritage, and local communities". The winescape concept is closely tied to the notion of terroir, which emphasizes the unique environmental conditions and cultural characteristics of a wine-producing region. However, while terroir primarily focuses on wine production and its quality, winescape extends beyond this, incorporating tourism, sensory experiences, and the social and cultural aspects of wine consumption. It is particularly relevant in wine tourism studies, as it captures the holistic experience of visiting a wine region, where factors like landscapes, architecture, climate, and people collectively shape the visitor's perception and enjoyment of wine. By the early 2000s, winescape became a central concept in wine tourism research, used to analyze how different environmental factors contribute to the attractiveness of wine destinations. Thus, winescape has evolved from a term describing the physical attributes of a wine region into a multidimensional concept that encompasses environmental, cultural, and experiential factors. Its significance lies in its ability to explain why certain wine destinations are more successful in attracting tourists and fostering positive emotional connections between visitors and the region.

1.1 Differences in scholarly perspectives: the evolution of Winescape models

The models of winescape have evolved significantly over time, each serving a distinct purpose within the broader academic and practical discussion on wine tourism. Some models are definitional and conceptual, aiming to establish what winescape actually is and how it functions within different contexts. Others are behavioral and motivational, focusing on how tourists interact with the winescape and what drives their decisions. A third group consists of strategic and marketing models, which explore how the winescape can be leveraged as an economic or branding tool. Each of these categories has contributed to refining and expanding the winescape framework, making it a more sophisticated and

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multidimensional concept. Studying these frameworks is important to understand how research on the concept of winescape has evolved and which attributes have emerged as fundamental.

The definitional and conceptual models provide the foundation for understanding winescape. One of the earliest was introduced by Peters (1997), who first described winescape as the attributes of a grape-growing region, emphasizing the physical and cultural landscapes that define wine destinations. This idea was soon expanded by Telfer (2000), who broke winescape down into three primary elements: vineyards, winemaking activities, and wineries. Telfer's model was useful in making a clear distinction between the physical components of winescape and the broader experiential factors later introduced by other scholars. Around the same time, Hall et al. (2002) proposed a more comprehensive definition that extended winescape beyond the physical space to include elements of terroir, cultural identity, and heritage. The Johnson and Bruwer (2007) model took this a step further by incorporating additional attributes such as towns, people, and architectural heritage, presenting winescape as a multilayered system that includes both tangible and intangible components. More recently, Sidali, Kastenholz, and Bianchi (2015) refined this idea by explicitly defining winescape as a fusion of tangible (landscape, wineries, physical environment) and intangible (heritage, cultural identity, sensory perception) factors, emphasizing the importance of place attachment. The most recent comprehensive attempt to unify these perspectives comes from Terziyska (2022), who developed a holistic winescape framework that synthesizes previous definitions and classifies winescape into six key elements: destination features, wine, people, wineries, food and dining, and symbols. This framework provides a structured way to understand how winescape operates across different wine regions.

While conceptual models define what winescape is, the behavioral and motivational models explore how wine tourists engage with it. One of the first attempts to study winescape from a behavioral perspective was made by Bruwer and Alant (2009), who argued that winescape plays a hedonic role in wine tourism. Their study was among the first to emphasize how tourists emotionally interact with winescape elements, suggesting that sensory engagement, social interaction, and immersion in the landscape were crucial in shaping tourist satisfaction. Shortly after, Thomas, Quintal, and Phau (2010) proposed a dual-level model that distinguished between macro winescape, which includes regional factors such as culture, history, and facilities, and micro winescape, which focuses on the immediate winery environment, including design, staff, and atmosphere. This distinction proved critical in later research, as it helped explain why tourists might be drawn to a wine region as a whole but also why specific wineries can succeed or fail based on their localized winescape characteristics. In a further refinement, Bruwer, Gross, and Lee (2016) introduced a multilayered winescape model, emphasizing the interaction between cognitive and affective elements in shaping tourist behavior. This approach showed that winescape is not just a physical setting but a complex, immersive experience that can evoke emotions and influence decision-making. Building on these behavioral studies, Quintal, Thomas, and Phau (2015) integrated winescape into the Theory of Planned Behavior (TPB), which is widely used in tourism studies to predict consumer decisions. Their model demonstrated that winescape attributes directly shape attitude toward a winery, which in turn influences tourists' intention to revisit and recommend. This was one of the first empirical studies to systematically link winescape attributes to behavioral intention, confirming that elements such as staff interactions, landscape aesthetics, and the perceived authenticity of the experience all have a measurable impact on wine tourism consumption. More recent studies, such as Kim and Bonn (2016), have further emphasized the importance of authenticity, arguing that tourists are more likely to develop an emotional connection to a destination if the winescape feels genuine and historically rich. Similarly, Brochado, Stoleriu, and Lupu (2019) introduced a multisensory perspective, identifying which sensory dimensions (sight, taste, smell, touch, sound) contribute most to a positive winescape experience.

While behavioral models focus on how tourists perceive and interact with winescape, strategic and marketing models examine how wineries and regions can use winescape as a branding tool or economic asset. One of the earliest contributions in this area came from Getz and Brown (2006), who identified the critical success factors for wine tourism regions, demonstrating that winescape plays a fundamental role in making destinations competitive. Their study showed that wine regions with a strong winescape identity, such as Bordeaux, Tuscany, and Napa Valley, are able to attract more visitors and sustain higher levels of tourism revenue. Later, McFarlane et al. (2016) positioned winescape within the framework of regional sustainability, arguing that it has a spillover effect on local economies by stimulating demand for complementary services such as gastronomy, accommodation, and cultural tourism. This perspective was further expanded by Andrade-Suárez and Caamaño-Franco (2020), who focused on the role of industrial heritage in shaping winescape attractiveness, particularly in historic wine-producing regions.

A more business-oriented approach was taken by Santos, Ramos, and Almeida (2019, 2020, 2022), argue that winescape should be seen as a strategic asset, meaning that wineries and regional tourism boards should actively manage and promote specific winescape attributes (such as vineyard aesthetics, historic architecture, and wine storytelling) to create a differentiated market position. Similarly, Kubát, Králiková, and Ryglová (2023) have expanded the winescape model beyond wine tourism to a broader destination branding strategy, showing how the principles of winescape can be applied to rural tourism, gastronomy tourism, and heritage marketing. Together, these models demonstrate that winescape is far more than just a landscape, it is a multidimensional construct that influences tourist perception, business strategy, and regional development.

Purpose of the paper. *The concept of winescape is crucial in wine tourism research because it encapsulates the holistic and multisensory nature of the wine tourism experience. Unlike other forms of tourism, wine tourism is deeply rooted in place-based authenticity, where the physical and cultural environment plays a fundamental role in shaping visitor satisfaction and loyalty.*

Furthermore, winescape plays a key role in differentiating wine destinations. As global competition among wine regions intensifies, destinations must leverage their unique winescape attributes to attract visitors.

Given the importance of winescape in wine tourism, the purpose of this paper is to analyze and systematize the existing contributions on the topic and to provide a unified conceptual model. This model, based on a meta-analysis conducted through a literature review, can also be applied to different wine-related contexts and serves as a consolidated expression of the various models proposed to date.

Methodology. *To ensure a systematic and transparent approach in article selection, the PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was adopted. The research was conducted using the Scopus database, employing the keyword "winescape" without Boolean operators, to obtain the broadest possible range of relevant results. This methodological choice was driven by the need to comprehensively explore existing literature to develop a theoretical framework that identifies the common components of winescape across different studies.*

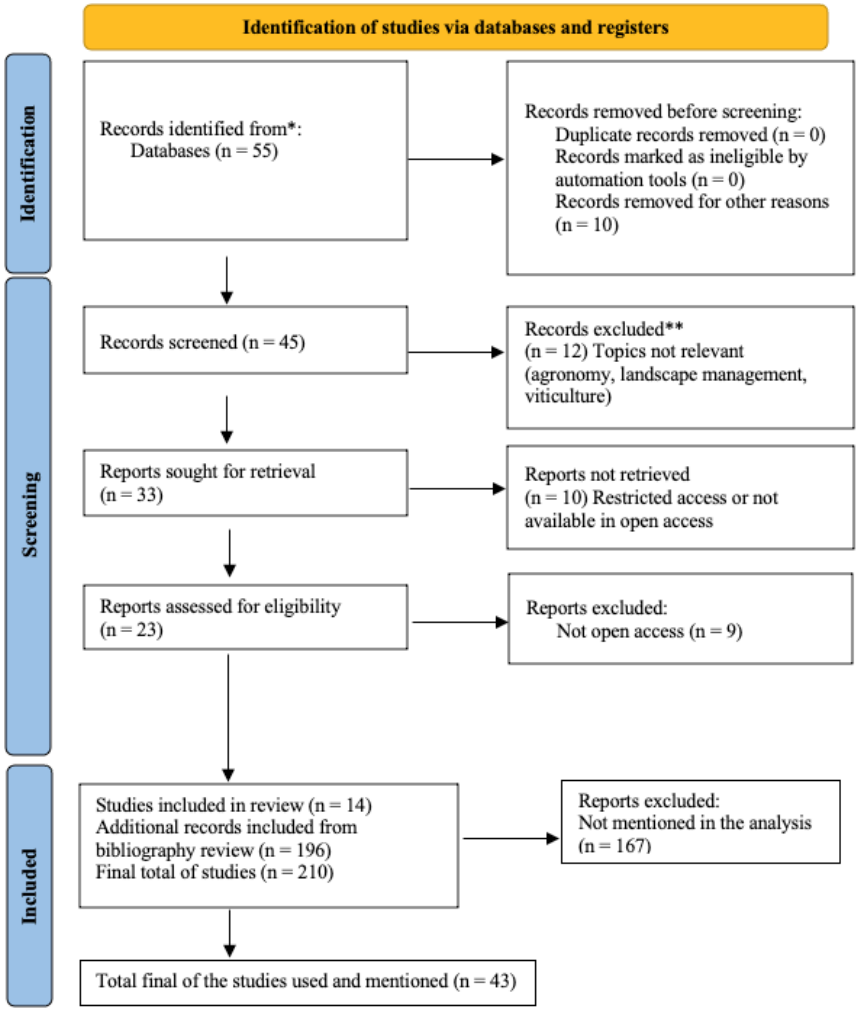
Phase 1) Identification: the initial search yielded 55 articles. At this stage, books and conference proceedings were excluded, retaining only scientific articles, editorials, and reviews, reducing the number of documents to 45.

Phase 2) Screening: the titles and abstracts of the 45 articles were analyzed to assess their relevance to the concept of winescape within the context of wine tourism, so, using the Boolean operator AND, the word 'tourism' was included. Following this evaluation, 33 articles were deemed relevant, while the remaining ones were excluded as they focused on unrelated topics, such as agronomy, landscape management, and viticulture.

Phase 3) Eligibility: to further refine the selection, an in-depth analysis of the articles was conducted, considering their objectives, methodology, and results. At this stage, only open-access articles were included, further reducing the corpus to 23 documents. Through a manual selection based on thematic relevance, 14 articles specifically focused on wine tourism and wine experience were selected.

Phase 4) Inclusion: one possible limitation of this methodology is the risk of excluding articles discussing the concept of winescape without explicitly using this term in their keywords, thus escaping the adopted search criteria. To address this issue, all relevant articles cited in the bibliography of the 14 selected papers were included in the analysis. This literature review resulted in 250 documents, including papers, conference proceedings, books, and editorials. Their titles and abstracts were analyzed to assess their relevance. The sources were then organized alphabetically, and duplicate records were eliminated, reducing the total number to 196 articles. Adding these to the 14 initial pilot articles, the final number of documents is 210 of these 43 were used and mentioned in the analysis.

Tab. 1: Table PRISMA model application



Results

Quantitative: frequency analysis

Based on the frequency analysis of the bibliography of this specific review, the most prolific author in this dataset appears to be Johan Bruwer, who has co-authored multiple papers on wine tourism, winescapes, and consumer behavior in the wine industry. Other authors with several contributions include Vânia Santos, Beverley Sparks, and Brent Thomas, who have explored various dimensions of wine tourism and consumer experiences. While "The International Journal of Wine Business Research", "Tourism Management", and "Sustainability" are among the most frequently cited journals in this field. These journals focus on wine tourism, sustainable tourism, and the broader hospitality industry, making them key outlets for research on winescapes. Furthermore, the year 2021 stands out as the most productive, with multiple papers published on wine tourism, winescapes, and related topics. This could indicate a growing academic interest in the field, possibly influenced by the evolving landscape of tourism and hospitality post-pandemic.

Tab. 2: Bibliography information

Title	Authors	Year of Publication	Journal
The Relationship Between Industrial Heritage, Wine Tourism, and Sustainability: A Case of Local Community Perspective.	Andrade-Suarez, M., Caamaño-Franco, I.	2020	Sustainability
How to Avoid a COVID-19 Research Paper Tsunami? A Tourism System Approach.	Bausch, T., Gartner, W. C., Ortanderl, F.	2021	Journal of Travel Research
Servicescapes: The impact of the physical surroundings on customers and employees.	Bitner, M. J.	1992	Journal of Marketing
Wine Tourism: A Multisensory Experience.	Brochado, A., Stoleriu, O., Lupu, C.	2021	Current Issues in Tourism
The hedonic nature of wine tourism consumption: An experiential view.	Bruwer, J., Alant, K.	2009	International Journal of Wine Business Research
Tourism destination image (TDI) perception within a regional winescape context.	Bruwer, J., Gross, M.J., Lee, H.C.	2016	Tourism Analysis
Tourism destination image of Western Australia's wine regions: A study of Chinese wine tourists.	Bruwer, J., Gross, M. J., Lee, H. C.	2016	Tourism and Hospitality Research
A Multilayered Macro Approach to Conceptualizing the Winescape Construct for Wine Tourism.	Bruwer, J., Gross, M. J.	2017	Tourism Analysis
The effects of architectural congruence perceptions on winery visitors' emotions and behavioral intentions: The case of Marqués de Riscal.	Bufquin, D., Back, R. M., Park, J-Y., Nutta, M. W. W.	2018	Journal of Destination Marketing and Management
Understanding the wine tourism experience for winery visitors in the Niagara region, Ontario, Canada.	Carmichael, B.	2005	Tourism Geographies
Critical success factors for wine tourism regions: A demand analysis.	Getz, D., Brown, G.	2006	Tourism Management
Wine-experienscape and tourist satisfaction: Through the lens of online reviews.	Gunasekar, S., Das, P., Dixit, S. K., Mandal, S., Mehta, S. R.	2021	Journal of Foodservice Business Research
Wine tourism around the world: Development, management and markets.	Hall, C. M., Sharples, L., Cambourne, B., Macionis, N.	2002	Butterworth-Heinemann
The Servicescape as an Antecedent to Service Quality and Behavioral Intentions.	Hooper, D., Coughlan, J., Mullen, M. R.	2013	Journal of Services Marketing
Regional brand image and perceived wine quality: The consumer perspective.	Johnson, R., Bruwer, J.	2007	International Journal of Wine Business Research
Authenticity: Do Tourist Perceptions of Winery Experiences Affect Behavioral Intentions?	Kim, H., Bonn, M. A.	2016	International Journal of Contemporary Hospitality Management
The winescape as a tool of wine tourism destination branding.	Kubát, J., Králíková, T., Ryglová, K.	2023	Journal of Destination Marketing & Management
Shipscape influence on the leisure cruise experience.	Kwortnik, R. J.	2008	International Journal of Culture, Tourism and Hospitality Research
Festivalscapes and patrons' emotions, satisfaction, and loyalty.	Lee, Y., Lee, C., Lee, S., Babin, B. J.	2008	Journal of Business Research
Combining amenity with experience: Exploring the hidden capital of a winescape experience.	McFarlane, J., Grant, B., Blackwell, B., Mounter, S.	2016	Tourism Economics
American Winescapes: The Cultural Landscapes of America's Wine Country.	Peters, G. L.	1997	Westview Press
Wine tourism in Australia.	Peters, G.	1997	Australian & New Zealand Wine Industry Journal
Experienscape: Expanding the concept of servicescape with a multi-stakeholder and multi-disciplinary approach.	Pizam, A., Tasci, A. D. A.	2019	International Journal of Hospitality Management
Iconic Architecture as a Catalyst for Wine Tourism: A Case Study of Marques De Riscal.	Plaza, B., Esteban, M., Aranburu, I., Jensy, J.	2024	European Countryside
Incorporating the winescape into the theory of planned behaviour: Examining 'new world' wineries.	Quintal, V. A., Thomas, B., Phau, I.	2015	Tourism Management
Wine and Wine Tourism Experience: A Theoretical and Conceptual Review.	Santos, V., Ramos, P., Almeida, N., Santos-Pavon, E.	2019	Worldwide Hospitality and Tourism Themes
Developing a Wine Experience Scale: A New Strategy to Measure Holistic Behaviour of Wine Tourists.	Santos, V., Ramos, P., Almeida, N., Santos-Pavón, E.	2020	Sustainability
Mapping the wine visit experience for tourist excitement and cultural experience.	Santos, V., Dias, A., Ramos, P., Madeira, A., Sousa, B.	2021	Annals of Leisure Research
Is Wine Tourism a Niche Tourism? Antecedents and Consequences of Wine as a Niche Tourism, a Conceptual Model.	Santos, V., Ramos, P., Sousa, B.	2021	Springer
The Influence of wine storytelling on the global wine tourism experience.	Santos, V., Dias, A., Ramos, P., Madeira, A., Sousa, B.	2022	Wine Economics and Policy
Towards a framework for the global wine tourism system.	Santos, V., Ramos, P., Sousa, B., Valeri, M.	2022	Journal of Organizational Change Management
A review of wine tourism destination image studies from 2001 to 2020.	Sekhniashvili, G.	2021	GeoJournal of Tourism and Geosites
Developing a Wine Tourism Destination Image Measurement Scale.	Sekhniashvili, G.; Bujdosó, Z.	2023	Sustainability
Food tourism, niche markets and products in rural tourism: Combining the intimacy model and the experience economy as a rural development strategy.	Sidali, K. L., Kastenholz, E., Bianchi, R.	2015	Journal of Sustainable Tourism
Planning a Wine Tourism Vacation? Factors That Help to Predict Tourist Behavioural Intentions.	Sparks, B.	2007	Tourism Management
Tastes of Niagara: Building alliances between tourism and agriculture.	Telfer, D. J.	2000	International Journal of Hospitality & Tourism Administration
Winescape through the lens of organized travel—A netnography study.	Terziyska, I.; Damyanova, R.	2020	International Journal of Wine Business Research
A framework for analyzing winescape experiences.	Terziyska, I.	2022	Journal of Tourism Research
Predictors of attitudes and intention to revisit a winescape.	Thomas, B., Quintal, V. A., Phau, I.	2010	Australian and New Zealand Marketing Academy Conference
A Research Proposal to Explore the Factors Influencing Wine Tourist Satisfaction.	Thomas, B., Quintal, V. A., Phau, I.	2010	Australian and New Zealand Marketing Academy
Developing a scale that measures the winescape.	Thomas, B., Quintal, V. A., Phau, I.	2010	Australian and New Zealand Marketing Academy
Wine tourism: A macro and micro approach to conceptualizing the winescape.	Thomas, B., Quintal, V. A., Phau, I.	2010	Journal of Hospitality and Tourism Research

Qualitative: development of a unified Winescape model: The Integrated Winescape Framework (IWF)

Based on the extensive meta-analysis conducted, the paper proposes an Integrated Winescape Framework (IWF) that unifies existing models, incorporates empirical findings, and allows for broad applicability in various wine-related contexts (e.g., wine tourism, wine branding, and wine marketing). This framework synthesizes the macro-level, micro-level, and experiential dimensions of winescape, ensuring that it serves as a comprehensive and applicable model.

The IWF model integrates insights from previous theoretical models and organizes winescape attributes into five primary interconnected dimensions:

1. The Physical Winescape (Macro and Micro-Level Integration)

This dimension represents the tangible and geographical elements that shape the winescape experience. It includes:

- *Vineyards and natural landscapes - topography, climate, and scenery (Bruwer & Alant, 2009; Johnson & Bruwer, 2007).*
- *Winery Architecture and Facilities - cellar doors, wine storage, and traditional vs. modern winery designs (Thomas et al., 2010; Bufquin et al., 2018; Plaza et al., 2024)*
- *Infrastructure and accessibility - roads, accommodation, signage, and ease of movement within the wine region (Sekhniashvili & Bujdosó, 2023).*

2. The Cultural and Historical Winescape

This component focuses on the heritage, identity, and traditions embedded within wine-producing regions. It includes:

- *Terroir and Wine Heritage - the link between land, tradition, and wine quality (Hall et al., 2002).*
- *Storytelling and Regional Identity - the role of narratives in branding wine regions (Santos et al., 2022).*
- *Local Community and Hospitality - the people who shape the visitor experience through interactions, knowledge sharing, and cultural immersion (Santos et al., 2021).*

3. The Sensory and Experiential Winescape: drawing on "experienscape" theories (Pizam & Tasci, 2019; Gunasekar et al., 2022)

This dimension includes:

- *Multisensory Stimulation - taste (wine quality, pairing), sight (vineyards, cellar aesthetics), smell (wine aromas), sound (ambient music, nature), and touch (wine textures).*
- *Emotional and Psychological Impact - how sensory cues influence visitor perceptions and memory formation (Brochado et al., 2021; Andrade-Suárez & Caamaño-Franco, 2020).*

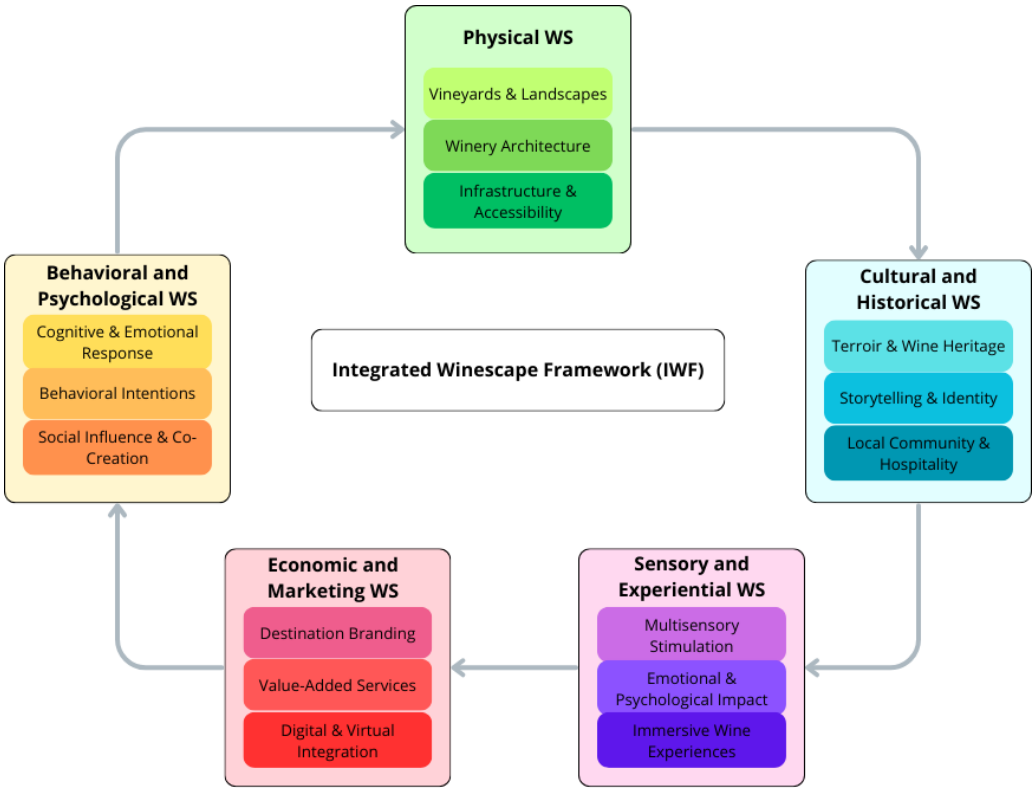
- *Immersive Wine Experiences - tasting events, vineyard tours, and interactive wine-making activities (Santos et al., 2020).*

4. *The Economic and Marketing Winescape*
   Recognizing the commercial and strategic role of winescape, this dimension encompasses:
- *Destination Branding and Market Positioning - how winescape contributes to wine region competitiveness (Sekhniashvili & Bujdosó, 2023).*
- *Value-Added Services - complementary offerings such as gourmet food pairings, local crafts, and wellness tourism (Santos et al., 2020).*
- *Digital and Virtual Integration - the use of augmented reality (AR), digital storytelling, and online wine tourism experiences (Bausch et al., 2021).*

5. *The Behavioral and Psychological Winescape*
   This dimension examines how winescape affects consumer behavior and tourism engagement:
- *Cognitive and Emotional Response to Winescape - the psychological processes behind wine excitement, place attachment, and consumer loyalty (Kim & Bonn, 2016; Bruwer et al., 2016).*
- *Behavioral Intentions - the impact of winescape on return visits, word-of-mouth recommendations, and wine purchases (Quintal et al., 2015).*
- *Social Influence and Co-Creation - the role of peer interactions, online reviews, and visitor-generated content in shaping winescape perceptions (Santos et al., 2019).*

The Integrated Winescape Framework (IWF) synthesizes the most significant findings from past studies, offering a comprehensive and adaptable model. Unlike previous frameworks that focus on either supply-side attributes (winery design, infrastructure) or demand-side experiences (tourist perceptions, sensory engagement), the IWF connects both dimensions within a single, unified model. Its adaptability allows for cross-disciplinary applications, from destination branding and tourism development to wine marketing and consumer engagement strategies.

Fig. 1: Integrated Winescape Framework (IWF) by the author, 2025



Research limitations. *One of the primary limitations of this research is that, while the Integrated Winescape Framework (IWF) represents a significant theoretical advancement by consolidating multiple models and measurement scales into a unified structure, it remains untested. This means that, although the framework provides a comprehensive conceptualization of winescape, it has yet to undergo empirical validation to determine which components are most impactful in practice and how they interact to shape consumer behavior. Without systematic testing, it is unclear whether all dimensions of the model contribute equally to the wine tourism experience or whether certain elements exert a stronger influence than others. Additionally, another crucial limitation lies in the lack of understanding regarding how these*

winescape attributes function within the consumer decision-making process. While the framework organizes winescape into physical, cultural, sensory, economic, and behavioral dimensions, it does not clarify at which stage of the decision funnel-awareness, consideration, conversion, or loyalty-each attribute exerts its influence. For instance, it remains unknown whether the natural landscape and architectural aesthetics primarily attract first-time visitors or whether they also play a role in fostering long-term destination loyalty. Similarly, it is uncertain whether sensory elements such as wine tasting and hospitality experiences impact the initial decision to visit or if they are more significant in determining repeat visits and recommendations. Understanding these distinctions is essential, as it would allow for a more targeted application of winescape in both tourism strategy and marketing efforts. As this research is a conceptual work in progress, the next commitment will be to address these limitations, by implementing empirical validation to map each winescape attribute to a specific stage in the consumer decision funnel. This would require a combination of behavioral analysis, survey-based research, and experimental testing to measure the real impact of winescape dimensions on visitor awareness, decision-making, and long-term engagement.

Future Research Directions

Through the meta-analysis conducted in this study, a crucial research gap has emerged: while winescape has been widely explored in relation to natural landscapes, sensory experiences, and cultural elements, the role of winery architecture and spatial design in shaping the wine tourism experience remains significantly underexplored. Despite being theoretically recognized as a fundamental component of winescape, very few empirical studies have examined its direct influence on tourist perceptions, emotions, and behavioral outcomes. In fact, only two notable studies explicitly address this topic, (Plaza et al. 2022) and (Bufquin et al. 2018). The first study explores how the avant-garde architectural design of the Marqués de Riscal winery has reshaped brand perception, transforming the winery into an international attraction where visitors are drawn not only for wine tasting but also for wine-related services and architectural appreciation. This has had a substantial impact on the tourist flows of the entire wine region, demonstrating that winery design can function as a primary driver of destination attractiveness. The second study investigates how architectural congruence, or the perception of a winery's design aligning harmoniously with its surroundings, affects visitors' emotions and behavioral intentions. The findings suggest that when winery architecture is perceived as aesthetically coherent and thematically consistent, it enhances the overall tourism experience, evokes positive emotional responses, and increases visitor loyalty and intention to return. No systematic models integrate winery design into the winescape framework, and its impact across different architectural styles remains unclear. The interaction between architecture and other winescape elements, such as vineyards and visitor experiences, is also unexplored. Future research should develop models that assess winery architecture's role in tourist decision-making. Comparative studies across regions and styles, along with interdisciplinary collaboration, could refine measurement tools for its impact on destination branding.

Originality of the paper. *This paper offers a novel contribution to the study of winescape by constructing an integrated theoretical framework that consolidates and expands upon existing models. Unlike previous research, which has often analyzed winescape through fragmented approaches-focusing on either macro-level destination attributes, micro-level winery experiences, or experiential dimensions in isolation-this study develops a unified model that accounts for the interplay between physical, cultural, sensory, economic, and behavioral elements. By synthesizing insights from multiple disciplines, including wine tourism, marketing, consumer behavior, and environmental psychology, the paper provides a comprehensive and adaptable framework applicable to various wine-related contexts, from tourism development to branding strategies.*

Furthermore, this study advances the field by introducing the decision-making funnel as a new perspective for analyzing winescape attributes. Previous literature has examined winescape elements primarily in terms of their overall contribution to visitor experience, without clarifying at which stage of the consumer journey they exert the most influence. This paper proposes a new research direction, emphasizing the need to empirically test whether different winescape dimensions impact awareness, consideration, conversion, or loyalty. This innovative approach provides both theoretical and practical implications, allowing wine regions, winery operators, and tourism marketers to better tailor their strategies to different stages of consumer engagement.

As a result, this paper contributes to both academic discourse and industry application, providing a structured model that can guide future empirical validation and practical implementation in wine tourism and marketing.

Key words: *Winescape, wine tourism, wine experience, winery architecture, behavioral intentions*

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Exploring the Role of Sustainability in Achieving Customer Loyalty via PLS-SEM

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Abstract

Given the growing emphasis on sustainability, driven by institutions and governments worldwide, companies can no longer overlook its importance, not only for the essential ethical and social reasons but also as a strategic imperative. Consumers are becoming increasingly attentive to sustainability in their purchasing decisions and brands that adopt sustainable practices often experience higher levels of trust, greater customer satisfaction, and deeper emotional engagement. We developed a model that analyzes the impact of food values, subjective norm and brand preferences on customer loyalty. The model integrates the key components of Keller's Customer-Based Brand Equity model with Ajzen's Theory of Planned Behavior. The purpose of this paper is to test the model's predictive capability and explore the role of sustainability in achieving customer loyalty, given that the constructs identified as potential determinants of customer loyalty include items directly related to the theme of sustainability. We designed and administered a questionnaire through which 510 valid responses were collected. To test our path model, we resorted to Partial Least Squares Structural Equation Modeling (PLS-SEM), which allowed us to estimate the path coefficients and assess the predictive power of our constructs. T*he analysis was conducted using the R software.* Preliminary results provided empirical support for all our seven research hypotheses, with the predictor constructs displaying a moderate explanatory power for customer loyalty (R^2 around 0.4). *The research project is proposed as an ongoing work, with data collection and analysis activities set to continue in the near future.*

Framing of the research. *In September 2015, the United Nations approved the 2030 Agenda for Sustainable Development, a comprehensive action plan aimed at achieving 17 Sustainable Development Goals (SDGs) by 2030 (United Nations, 2015). The objective is to promote prosperity while protecting the planet and people, recognizing the importance of complementing economic growth with a range of social needs that have become true priorities. Within the program's vision, this represents a form of widespread social responsibility and several researchers in the literature emphasize the crucial role of both consumers and businesses in achieving these ambitious goals (e.g. Scheyvens et al. 2016; Van Zanten et al. 2018; Yildirim 2020). Given the growing emphasis on sustainability, driven by institutions and governments worldwide, companies can no longer overlook its importance, not only for the essential ethical and social reasons but also as a strategic imperative. In fact, as the focus on sustainability grows among both consumers and businesses, it becomes a fundamental aspect of brand equity (Ishaq et al. 2020) and customer loyalty, as the latter represents one of its core dimensions (Aaker 1995).*

An increasing body of research indicates that sustainability has a significant positive impact on customer loyalty. This occurs because consumers are increasingly sensitive to sustainability issues, and as a result, their purchasing behavior is influenced by the attention businesses pay to this matter (e.g. Grunert et al. 2011; Sesini et al. 2020). In industries where repeat purchases are common, such as food and related services, building long-term customer relationships through sustainability is particularly crucial. Brands that embrace sustainable practices often experience enhanced trust, greater customer satisfaction and deeper emotional engagement. Initiatives such as eco-friendly packaging, ethical sourcing and corporate environmental responsibility not only strengthen a brand's credibility and authenticity but also

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foster long-term customer retention (e.g. Khandai et al. 2023; Vuong et al. 2023; Agu et al. 2024; Carbajal-Rubio et al. 2024).

Since sustainability plays a pivotal role in achieving customer loyalty, many researchers today discuss concepts such as green loyalty and green brand equity (e.g. Gorska-Warsewicz et al. 2021; Zhang et al. 2023; Mirza et al. 2024). According to Chen (2013, p. 297), the concept of green loyalty can be defined as «the level of repurchase intentions prompted by a strong environmental attitude and sustainable commitment towards an object, such as a product, a service, a company, a brand, a group, or so on». When consumers perceive a brand as genuinely committed to environmental or ethical causes, they are more likely to develop strong purchase intentions and engage in advocacy behaviors (Vuong et al. 2023; Carbajal-Rubio et al. 2024). Recently, Martin-Garcia et al. (2023), by studying a sample of 510 consumers, explored the role of sustainability in achieving consumers' loyalty in food retailing, through technological innovation. Interestingly, they found that innovative practices support sustainability and the latter is a relevant element of the store's loyalty. In addition, Yang et al. (2023) investigated - by applying a structural equation modeling - how green cooperation between suppliers and customers affect sustainable consumer behaviors in South Korea, revealing that green cooperation positively affects sustainable behaviors and trust and, moreover, sustainable consumption behaviors can influence loyalty. Furthermore, Lerro et al. (2019) showed that loyalty, along with brand trust, impacts on Millennials' attitude towards sustainable initiatives by food companies.

Purpose of the paper. *We developed a conceptual framework to predict customer loyalty in the pasta food sector (Rosato et al. 2024). The purpose of the paper is to test the predictive capability of the model and explore the role of sustainability in achieving customer loyalty. Our approach was inspired by the work of Izquierdo-Yusta et al. (2022), which analyzes the impact of food values, subjective norm and brand preferences on customer loyalty in another food sector. However, the framework we developed is quite different from that of the Authors, as it establishes the determinants of customer loyalty by integrating Keller's (2001) Customer Based-Brand Equity (CBBE) model with Ajzen's (1991) Theory of Planned Behavior (TPB).*

In particular, we assume that customer loyalty (CL) is determined by the coexistence of both behavioral loyalty and attitudinal loyalty, as explained by Keller (2001) and Kotler (2022). This is one of the five constructs of the model. Behavioral loyalty is understood in terms of the repetitiveness of purchases made over time, the amounts spent and the quantities purchased (Keller 2001). Attitudinal attachment is understood in terms of personal attachment to the brand, which becomes special to the consumer (Keller 2001).

Since studying customer loyalty entails analyzing consumer behavior, we refer to the TPB (Ajzen 1991), as it is one of the most accredited theories for studying human behavior. In our case, the behavior we aim to predict is the loyal behavior of the customer towards their favorite brand. The TPB clearly highlights how, in general, behavior is influenced by an individual's attitude. For this reason, our model includes the constructs cognitive attitude towards behavior (CATB) and emotional attitude towards behavior (EATB). These two constructs are designed to examine the mental and emotional states of individuals towards their favorite brand. Keller (2001) also asserts that brand resonance can only be achieved by stimulating both rational and emotional customer engagement. Consequently, the two constructs have been structured according to the logic of Keller's pyramid. The CATB construct is derived from the summation of measurements related to brand performance and consumer judgments, whereas the EATB construct is based on the summation of measurements related to brand imagery and consumer feelings. Brand preferences are therefore determined by the sum of CATB and EATB.

Finally, the model includes subjective norm (SN) as a construct, understood as the social pressure perceived by an individual when deciding whether to perform a given behavior, as defined by Ajzen (1991). The literature recognizes subjective norm as a reliable predictor of food choices (Povey et al. 2000) and especially healthy ones (Chen, 2016; Van Loo et al. 2017). We assume that the subjective norm, by determining the possibility of amplifying or not the relationship with the brand, can be relevant in terms of repetition of purchasing behaviour over time in terms of loyalty.

In our path model, all the aforementioned constructs are reflective. The only formative construct is food values (FV), in line with the approach of Izquierdo-Yusta (2022). The values associated with food products undoubtedly influence the purchasing decision among the various existing brands and types. The more significant these attributes are to an individual and the more positively they are perceived in relation to the performance of their favorite brand, the greater the assumed potential increase in behavioral loyalty within the sector. Furthermore, since behavior is influenced by both attitude and subjective norm (Fishbein & Ajzen 1975), it is also assumed that these values exert an influence on these variables.

Consequently, based on the explanations outlined (for further details on the model construction, see Rosato et al. 2024), the proposed research hypotheses are as follows:

H1. Food values exert a positive and significant influence on subjective norm.
H2. Food values exert a positive and significant influence on emotional attitude towards behavior.
H3. Food values exert a positive and significant influence on cognitive attitude towards behavior.
H4. Subjective norm exerts a positive and significant influence on customer loyalty.
H5. Subjective norm exerts a positive and significant influence on emotional attitude towards behavior.
H6. Cognitive attitude towards behavior exerts a positive and significant influence on customer loyalty.
H7. Emotional attitude towards behavior exerts a positive and significant influence on customer loyalty.

The constructs used as potential determinants of customer loyalty include items directly related to the theme of sustainability (e.g. genuineness of food, quality and origin of raw material, eco-friendly packaging, environmental impact of production, social pressure for sustainability). This allowed us to understand and highlight the role played by sustainability in the journey the consumer takes towards loyalty. By the way, as to our knowledge, sustainability is not enough considered in loyalty constructs, specifically the typology of product we chose (pasta) is little considered in these kinds of studies, so- through this ongoing research- we try to cover this gap.

Methodology. *We adopted a quantitative methodology to test the model. In particular, a questionnaire was designed with the aim of gathering information primarily on the socio-demographic, geographic and behavioral profile of the respondents, as well as on all five constructs of the model (FV, CATB, EATB, SN, CL). The questionnaire was administered in August 2024 and 510 valid responses were obtained. It is currently open, as the research presented is an ongoing study, part of a broader research whose data collection and analysis will continue in the near future (Rosato et al. 2024). Data were analyzed using the statistical software R.*

The main characteristics of the sample are presented, with further details on the Exploratory Data Analysis (EDA) conducted and the detailed construction of the questionnaire provided in the previous work (Rosato et al. 2024). The sample is a non-probability and convenience sample. However, the high number of participants ensures that it is representative according to national averages (Istat 2023). Regarding the main socio-demographic and geographic characteristics, the age of 510 respondents ranges from 19 to 87 years old. Most people, however, are between 20 and 30 years old and between 50 and 60 years old. The average age is 45. 67% of the survey participants are female, compared to 33% male. The subjects sampled are mainly located in southern Italy or on the islands (84%), with negligible percentages of residents in the center (7%) and northern Italy (9%). The sample mainly comprises employed persons (322) and students (82). Annual income is distributed as follows: 5% earn €0-€5.000, 15% earn €5.001-€15.000, 34% earn €15.001-€28.000, 33% earn €28.001-€50.000 and 13% earn over €50.000. The largest group (67%) earns between €15.001 and €50.000. As far as the behavioral aspect is concerned, all respondents claim to have a single brand preference for pasta (brand lovers). Each of them was asked to explicit it and the favorite brands by the majority of respondents are: Molisana (24%), Rummo (18%), De Cecco (14%) and Garofalo (11%). Barilla and Divella were preferred by the 10% and the 9% of the sample respectively. Although all survey participants have a brand preference, they do not show the same degree of loyalty to what they claim to prefer. They declare themselves very loyal (hard-core loyals) to their favorite brand in 71 out of 510 (14%): they buy/eat only and always that brand. Of the remaining, 67 out of 510 (13%) say they buy/eat a little all brands (shifting loyals) and 372 out of 510 (73%) buy/eat their favorite brand and at most two or three other brands (split loyals). Most respondents are certainly concentrated in the latter category. The 68% of the sample (349) said that they usually go food shopping for themselves (53), for themselves and their partner (84), for their family (39) and for their family and children (173). Finally, in the sample, 49% of the subjects eat pasta from two to four times a week (average users), 38% five or more times a week (heavy users) and only 13% declared they eat it one time a week (light users).

In order to analyze the impact of food values, subjective norm and brand preferences on customer loyalty in the pasta food sector, it is possible to resort to Structural Equation Modeling (SEM). SEM allows us to study the complex relationships between the variables in our path model. Partial Least Squares (PLS) SEM focuses on explaining the variance in our dependent variables and might perform better than covariance-based SEM when formative constructs are involved in our framework (Sarstedt et al. 2021).

As can be seen in Figure 1, when modeling our questionnaire data, the construct related to food values (FV) was measured using a formative approach. This is consistent with what was done by Izquierdo-Yusta et al. (2022) and is further justified by the fact that a uniform pattern of high correlations was not found among the indicators considered. Indeed, in Figure 2 one can see how indicators like Genuineness, Taste and Price tended to be less correlated with the other indicators for this construct. In contrast, the indicators used to reflectively measure the other constructs showed more homogeneous correlation patterns (charts omitted).

This PLS-SEM model was fitted using the seminr R package (Hair Jr. et al. 2021). Before interpreting the results, several model checks were carried out, as suggested in Hair Jr. et al. (2021). The formative measurement model for FV was assessed in terms of convergent validity and relevance of the indicator weights. The quality of the reflective measurement models, instead, was evaluated with respect to indicator reliability, internal consistency and convergent and discriminant validity. The explanatory and predictive power of the structural model could finally be examined, yielding various insights on the research hypotheses.

Figure 1: Our path model. All constructs apart from Food Values are reflective.
The number of indicators for each concept is reported in the brackets. See Table 5 for the interpretation of path coefficients.

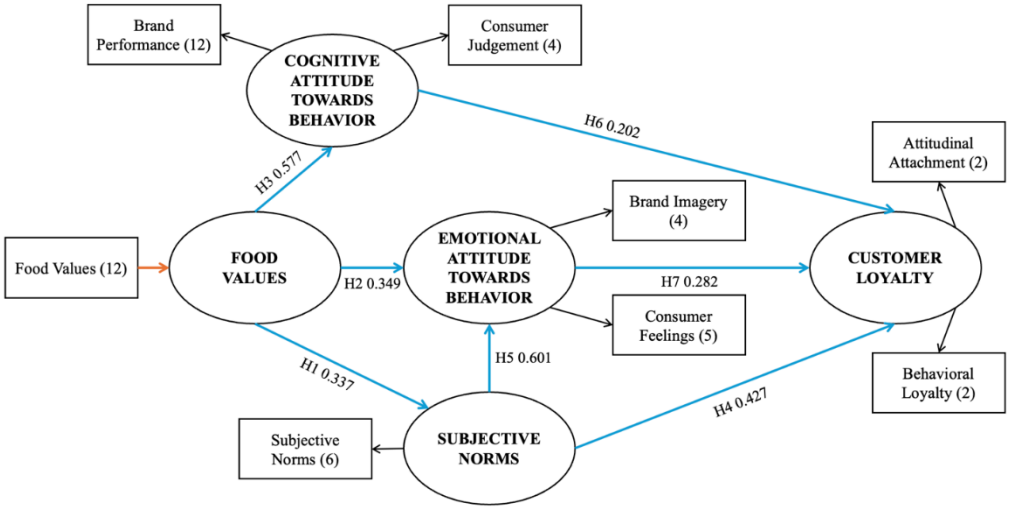
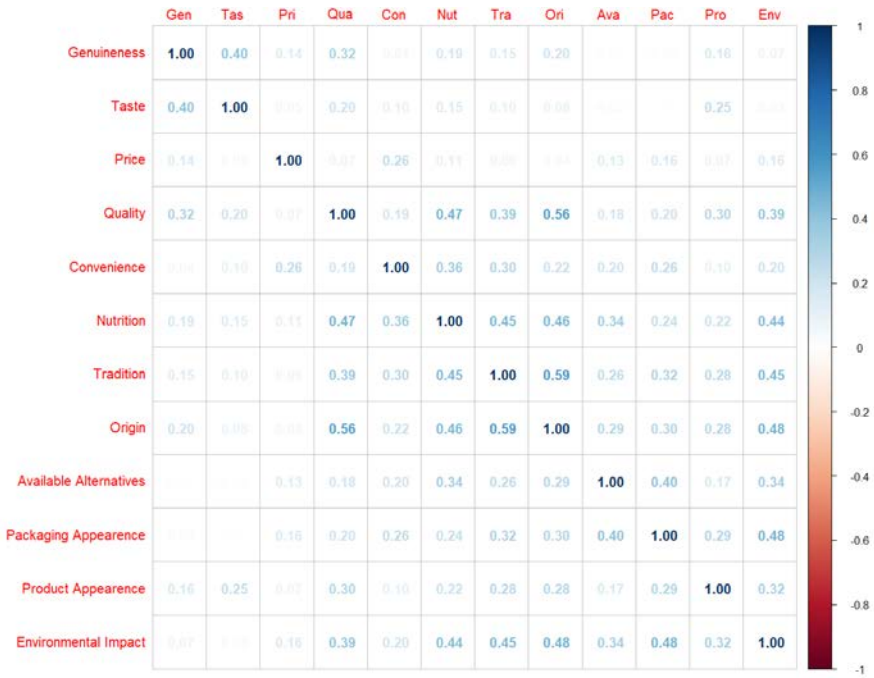


Figure 2: Correlations between the 12 indicators used to measure the FV construct.



Results. *The data analyzed consisted of 510 observations without missing values and the number of indicators underlying each construct can be retrieved in Figure 1. In Table 1, the loadings of all indicators used for reflective constructs are reported. While the reliability of the indicators was high for subjective norm (SN) and customer loyalty (CL), the cognitive and emotional attitude towards behavior (CATB and EATB) were not as effective at explaining the indicators' variance. The latter is given by the squared loadings, thus loadings lower than 0.708 imply that less than 50% of the variance of that indicator is explained by the construct. Although the Convenience item had a loading below 0.4, its removal did not lead to substantial improvements in model reliability, thus all indicators were kept for prediction. It is interesting to note that some of the indicators whose variability is best explained by CATB are connected to the concept of sustainability: Genuineness, Quality of Raw Material, Nutrition Values, Origin of Raw Material and Environmental Impact of Production.*

When it comes to the strength of the association between indicators measuring the same construct, statistics like ρ_A suggested that all reflectively measured constructs have high level of internal consistency reliability (values ranged from 0.820 to 0.885 - see Figure 3). However, the average variance extracted (AVE) was equal to 0.340 for CATB and to 0.394 for EATB, confirming how these constructs did not shine at explaining the variability of their indicators. As is visible in Table 1, this is due to the fact that only some of the many indicators measuring CATB and EATB had large loadings, which in turn may be explained by the fact that both these constructs contain two sub-constructs.

Nevertheless, the distinctions between the constructs included in the model depicted in Figure 1 found empirical support. Bootstrap confidence intervals (10000 replicates) confirmed the model's discriminant validity, with all HTMT ratios below the 0.85 threshold (see Table 2). This supports the distinctiveness of the constructs (Hair Jr. et al. 2021).

The first check for the formative construct in the model was collinearity. The highest VIF among the 12 FV indicators was 2.04, indicating that collinearity is not critical for this data. The significance of FV indicator weights was assessed via bootstrap confidence intervals (see Table 3). Eight out of twelve confidence intervals contained the value zero, suggesting that many indicators had a nonsignificant relative weight on this formative construct. However, this is often due to the fact that many indicators are being used to capture the domain of this construct and the greater their number, the lower their average weight (Hair Jr. et al. 2021). In these scenarios it is beneficial to also check the indicators' absolute contributions to the construct. For FV, these are shown in Table 4: now all bootstrap confidence intervals suggest that no absolute contribution is negligible. In addition, similarly to what happened to the loadings of the CATB reflective construct, some of the strongest contributions are given by indicators that are connected to sustainability, such as Quality of Raw Material, Nutrition Values, Origin of Raw Material and Environmental Impact of Production. This highlights how the information these two constructs bring to the model is largely related to the role played by this topic in the individuals' answers.

A preliminary step before evaluating the efficacy of our path model is to check that there is no sign of collinearity also at the level of the endogenous constructs. This is confirmed by the low VIF values for EATB (1.128 for FV and SN) and for CL (1.515 for CATB, 1.984 for EATB, 1.816 for SN).

Table 1: Loadings of all reflective indicators, arranged by construct.

Indicators	CATB	EATB	SN	CL
(FV2) Genuineness	0.725			
(FV2) Taste	0.483			
(FV2) Price	0.421			
(FV2) Quality	0.743			
(FV2) Convenience	0.333			
(FV2) Nutrition	0.705			
(FV2) Tradition	0.683			
(FV2) Origin	0.697			
(FV2) Available Alternatives	0.544			
(FV2) Packaging Appearance	0.525			
(FV2) Product Appearance	0.490			
(FV2) Environmental Impact	0.745			
(1) Consumer Judgements_Quality	0.474			
(2) Consumer Judgements_Credibility	0.511			
(3) Consumer Judgements_Consideration (NPS)	0.462			
(4) Consumer Judgements_Superiority	0.570			
(1) Brand Imagery_Fame		0.495		
(2) Brand Imagery_Diffusion		0.505		
(3) Brand Imagery_Reliability & Authenticity		0.534		
(4) Brand Imagery_Historicity		0.522		
(1) Consumer Feelings_Happiness		0.719		
(2) Consumer Feelings_Security		0.660		
(3) Consumer Feelings_Fulfilment		0.758		
(4) Consumer Feelings_Social Approval		0.680		
(5) Consumer Feelings_Good Memories		0.709		
(1) SN_Family & Friends			0.725	
(2) SN_Family & Friends			0.728	
(3) SN_Opinion Leaders			0.787	
(4) SN_Opinion Leaders			0.743	
(5) SN_Family & Friends			0.657	
(6) SN_Social Pressure for Sustainability			0.707	
(1) Resonance_Attachment				0.799
(2) Resonance_Attachment				0.886
(3) Resonance_Loyalty				0.793
(4) Resonance_Loyalty				0.792

Figure 3: Reliability plot showing the values of Cronbach's α, ρ_A and ρ_C for all constructs in the model.

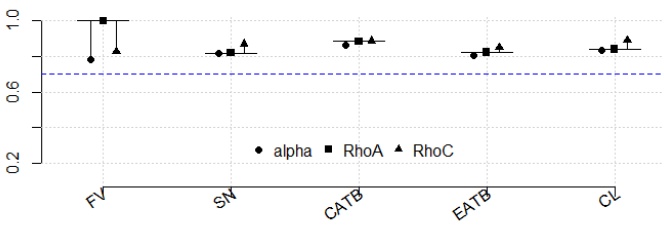


Table 2: HTMT bootstrap confidence intervals for 90% significance level. "B. Mean" and "B. SD" represent the average value of the bootstrap replicates and their standard deviation. "5% CI" and "95% CI" are the lower and upper boundary of the confidence interval given the chosen significance level. Here, picking a significance level equal to 10% allows us to conclude that each HTMT ratio is lower than its CI upper boundary with 5% significance level (one-tailed null hypothesis).

From	To	Estimate	B. Mean	B. SD	t Stat	5% CI	95% CI
SN	CATB	0.567	0.567	0.043	13.108	0.494	0.636
SN	EATB	0.794	0.793	0.033	24.060	0.737	0.845
SN	CL	0.638	0.637	0.045	14.030	0.558	0.709
CATB	EATB	0.664	0.663	0.037	17.999	0.600	0.722
CATB	CL	0.577	0.577	0.042	13.869	0.507	0.644
EATB	CL	0.649	0.649	0.041	15.947	0.581	0.714

Table 3: Indicator relative weights for the formative construct FV and their bootstrap confidence intervals for 95% significance level.

Indicator	Estimate	B. Mean	B. SD	t Stat.	2.5% CI	97.5% CI
Genuineness	0.202	0.194	0.0793	2.55	0.0374	0.349
Taste	0.141	0.139	0.0945	1.49	-0.0437	0.325
Price	3.07e-05	0.000608	0.0806	0.000381	-0.156	0.159
Quality	-0.0254	-0.0256	0.0896	-0.283	-0.200	0.152
Convenience	0.205	0.201	0.0953	2.15	0.0164	0.389
Nutrition	0.283	0.270	0.0918	3.08	0.0895	0.449
Tradition	0.177	0.172	0.0896	1.98	-0.00382	0.347
Origin	0.238	0.230	0.104	2.30	0.0244	0.431
Available Alternatives	0.134	0.131	0.0777	1.73	-0.0223	0.284
Package Appearance	0.0932	0.0908	0.0928	1.00	-0.0928	0.271
Product appearance	0.0584	0.0578	0.0832	0.702	-0.107	0.220
Environmental Impact	0.190	0.182	0.103	1.84	-0.0268	0.376

Table 4: Indicator absolute weights for the formative construct FV and their bootstrap confidence intervals for 95% significance level.

Indicator	Estimate	B. Mean	B. SD	t Stat.	2.5% CI	97.5% CI
Genuineness	0.413	0.403	0.0780	5.29	0.247	0.554
Taste	0.333	0.326	0.0925	3.60	0.139	0.501
Price	0.204	0.199	0.0955	2.14	0.00527	0.381
Quality	0.579	0.558	0.0660	8.76	0.424	0.681
Convenience	0.524	0.510	0.0859	6.10	0.335	0.670
Nutrition	0.755	0.729	0.0499	15.1	0.624	0.819
Tradition	0.706	0.684	0.0557	12.7	0.567	0.785
Origin	0.727	0.703	0.0588	12.4	0.580	0.808
Available Alternatives	0.494	0.476	0.0737	6.70	0.321	0.613
Package Appearance	0.500	0.483	0.0828	6.04	0.308	0.632
Product Appearance	0.429	0.416	0.0750	5.72	0.261	0.556
Environmental Impact	0.669	0.645	0.0762	8.77	0.477	0.775

Table 5: Path coefficients and their bootstrap confidence intervals for 95% significance level.

From	To	Estimate	B. Mean	B. SD	t Stat.	2.5% CI	97.5% CI
FV	SN	0.337	0.357	0.0440	7.58	0.265	0.440
FV	CATB	0.577	0.585	0.0360	16.1	0.514	0.652
FV	EATB	0.349	0.370	0.0440	7.91	0.282	0.455
FV	CL	0.302	0.316	0.0320	9.45	0.252	0.377
SN	EATB	0.601	0.598	0.0360	16.6	0.523	0.666
SN	CL	0.427	0.425	0.0460	9.28	0.334	0.513
CATB	CL	0.202	0.204	0.0490	4.10	0.107	0.301
EATB	CL	0.282	0.285	0.0560	5.06	0.176	0.395

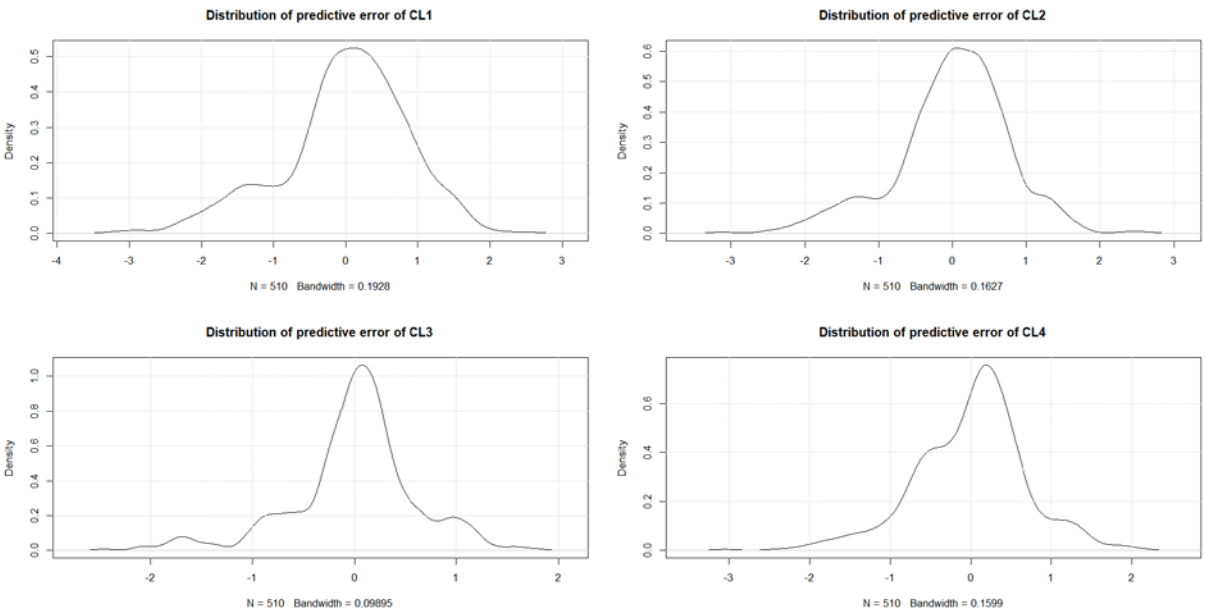
Now we are ready to examine the estimated path coefficients and assess their significance via bootstrap confidence intervals: the relevant data is reported in Table 5. By looking at the lower boundaries of the confidence intervals, it is easy to see that all our seven hypotheses were confirmed: all impacts quantified by direct path coefficients were positive and significant, even though their magnitude varied. The strongest impacts were those of FV on CATB (0.577) and of SN on EATB (0.601). Since PLS-SEM standardizes the data before estimation, this means that, for example, when the score of SN increases by one standard deviation unit, the score of EATB will increase by 0.601 standard deviation units (Hair Jr. et al. 2021). FV also showed a moderate impact on SN (0.337) and EATB (0.349) and its indirect impact on CL was similar (0.302). Relatively weaker were the impacts of CATB (0.202) and EATB (0.282) on CL. Recall that these two constructs had low AVE, suggesting that there may be room for improvement in their reflective measurement models - which in turn might lead to higher path coefficients.

In terms of explanatory power (or in-sample predictive power), the R^2 coefficient of the four endogenous constructs in the model were weak to moderate: 0.113 for SN, 0.332 for CATB, 0.443 for EATB and 0.396 for CL. Another measure

of the importance of the predictor constructs in the model is given by the f^2 effect size: FV scored 0.498 on CATB, 0.128 on SN and only 0.030 on EATB, whereas SN scored 0.566 on EATB. This suggests that FV was crucial in predicting CATB, consistently with the path coefficient seen above, but not that relevant for EATB, where SN played a major role.

As regards out-of-sample predictive power, the $PLS_{predict}$ procedure was followed, as suggested in Hair Jr. et al. (2021). This procedure relies upon k-fold cross-validation to assess the accuracy of the model at predicting the indicator values of new respondents to the questionnaire. In other words, the model is estimated on a subset of the observations and used to predict the responses of the held-out individuals. A ten-fold scheme was adopted, as it is common in the literature, and the procedure was repeated ten times to alleviate the possible impact of outlying sub-samples. The error measure used was the Root Mean Squared Error (RMSE), since the empirical distribution of predictive errors looked fairly symmetric - see Figure 4; in any case, using the Mean Absolute Error (MAE) did not change the results. These measures obtained from the PLS-SEM model are compared with those from a naive linear regression (LM) model, used as benchmark. On this data, three out of the four RMSE values for the CL construct were lower when using the PLS-SEM model instead of the naive LM model, suggesting a fairly good predictive power even out of sample.

Figure 4: Distribution of the predictive errors for the responses to the four CL indicators, obtained via the $PLS_{predict}$ procedure.



Research limitations. *We have overcome one of the limitations present in our previous study (Rosato et al. 2024). In particular, a more specific statistical analysis was conducted, which allowed for a better exploration of the potential predictive capability of the framework. The path model depicted in Figure 1 and estimated with PLS-SEM on our dataset showed empirical support to the seven research hypotheses on the impact of FV, SN, CATB and EATB on CL in the pasta market. However, some methodological aspects are worth considering for future developments.*

As far as the reflective measurement side is concerned, there are some possible improvements. Both the CATB and EATB constructs scored low AVE values and many of their indicators had indeed low loadings. This can be imputed to these constructs being composed of sub-constructs, leading to a heterogeneity that affected the reliability of some indicators. Izquierdo-Yusta et al. (2022) decided to exclude all reflective indicators with loadings lower than 0.708, a choice that would have led to a large loss of information in our data set. Nonetheless, it may pay off to explore the reliability and validity of a model in which only high-loading indicators are included.

Furthermore, it should be considered that the out-of-sample predictive power of the model could be better, as its relative improvement over the naive LM model was not remarkable. It is possible that a more solid configuration of the predictor constructs, with reliability gains, may lead to more powerful models, also thanks to a wider sample size.

As mentioned, the questionnaire is still open and the research project is ongoing. Therefore, we plan in the near future to increase the sample size while improving its homogeneity, particularly regarding the variables of gender and geographic location. This will allow us to enhance the statistical analysis conducted and, hopefully, generalize the obtained results.

Managerial implications. *The research conducted aims to provide businesses with a practical tool that allows them to quantitatively and qualitatively investigate the relationship established with their customers and their concrete possibility to continue showing loyalty towards the brand. This is made possible through the use of Keller's CBBE model and the measures he suggested for assessing the constructs.*

The data collected through the questionnaire would enable marketing managers to understand the outcomes of the strategies implemented by accurately gathering customer opinions and perceptions regarding business performance. Specifically, companies would be able to detect customers' cognitive and emotional attitudes towards the brand. The

integration of the TPB also allows for a better understanding of the role of subjective norm and, consequently, how crucial it is, for example, to develop strategies that incorporate influencers and opinion leaders for their specific business or to foster positive word-of-mouth.

Moreover, the inclusion of appropriate measures to assess the significance of various sustainability-related aspects makes it possible to understand exactly what customers prioritize and their specific needs connected to this issue. This helps businesses not only to move further along the path of sustainability but also to do so in a way that strategically enhances their brand equity.

Finally, by periodically administering the questionnaire to their customers and analyzing their consumption habits, marketing managers would have access to key numerical values that could help estimate, with good accuracy, future profits generated by already acquired and loyal customers. It is worth noting that the questionnaire can be adapted to specific business needs, making it possible to replicate the analysis in different industries and for other brands, products, or services.

Originality of the paper. *The originality of the research project lies in the characteristics of the proposed framework and in the rigor applied to its design. It integrates one of the most renowned theories in the literature for predicting human behavior (TPB, Ajzen 1991) with one of the most versatile and well-integrated models for defining brand management strategies aimed at achieving brand resonance (CBBE model, Keller 2001). Furthermore, its originality stems from the proposal of new constructs deemed capable of predicting customer loyalty beyond the existing literature (Izquierdo-Yusta 2022) and from the examination of the indirect role of sustainability in achieving customer loyalty through customers' cognitive and emotional evaluations. In addition, the presence of an Italian sample is another element of novelty, along with the product we selected, which are rarely considered in similar studies.*

Key words: *customer loyalty; sustainability; PLS-SEM; CBBE model; planned behavior; brand equity*

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Nutri-Score and Food Perception: Insights from an Italian Study

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Abstract

Among the key public health policies recommended by the World Health Organization to address the global epidemic of obesity and diet-related noncommunicable diseases is the adoption of front-of-pack nutritional labels (FoPLs). These labeling systems simplify the nutritional information on packaging, making it more accessible to consumers. Their primary objectives are twofold: first, to guide individuals toward healthier food choices, and second, to encourage food manufacturers to improve the nutritional quality of their products.

Among FoPLs, Nutri-Score has emerged as the most widely used in Europe. Designed to provide consumers with a quick and intuitive assessment of a product's nutritional value, it employs a color-coded scale ranging from dark green (healthiest) to red (least healthy), accompanied by corresponding letter grades.

When evaluating such a broad public health initiative, it is crucial to consider the anthropological and sociological significance of food, which is closely tied to health, pleasure, social life, and identity. These aspects are particularly relevant in Italy, where food consumption is often seen as a shared experience rather than a mere functional necessity.

This study explores the impact of Nutri-Score on how food is evaluated by the Italian population. Specifically, it examines whether the presence of Nutri-Score on packaging influences consumers' perceptions of healthiness and the economic value they attribute to food products. Additionally, the study investigates several individual factors that may affect these perceptions, including food literacy, adherence to the Mediterranean diet, chronotype, age, gender, body mass index (BMI), level of education, participation in nutrition-related courses, self-assessment of dietary habits, and prior knowledge of Nutri-Score.

To achieve these objectives, the study employed two complementary research methodologies: an online survey with 204 participants and an eye-tracking analysis involving 53 participants. In both experimental conditions, participants were divided into two groups: one viewed images of food products labeled with Nutri-Score, while the other saw the same products without the label. This approach enabled a direct comparison of perceptual differences between the two conditions, offering insights into whether Nutri-Score influenced consumer judgments.

Findings from both methodologies consistently supported the research hypothesis: Nutri-Score does not significantly alter Italian consumers' perceptions of nutritional quality, or the value attributed to food products. Despite its widespread use and intended purpose, the label did not substantially impact on how participants assessed the healthiness or desirability of the products. Notably, interesting patterns also emerged regarding the relationship between Nutri-Score, chronotype, and perceived value.

Framing of the research. *The proliferation of non-communicable diseases has prompted the implementation of various public health strategies, with FoPLs emerging as a key tool to empower consumers in making informed dietary decisions. These labels aim to simplify nutritional information, thereby encouraging healthier purchasing behaviors and incentivizing food companies to reformulate their products for improved nutritional profiles. The World Health Organization supports the adoption of FoP labels as a crucial policy instrument in the fight against obesity and diet-related illnesses (van der Bend & Lissner, 2019). In this context, the European Commission has expressed its intention to propose a harmonized and mandatory FoPL across the European Union (European Commission, 2020).*

Among the various FoPLs, the Nutri-Score has gained considerable traction and is currently adopted on a voluntary basis in several European countries. Developed by an independent French research group, the Nutri-Score utilizes an algorithm that balances the content of nutrients to limit (energy, sugars, saturated fats, and salt) against those to favor

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(proteins, fiber, and the proportion of fruits, vegetables, and legumes). This algorithm generates a summary score that translates into a five-color scale, ranging from A (dark green, indicating the highest nutritional quality) to E (red, indicating the lowest nutritional quality) (Mertz et al., 2024). This directive label aims to facilitate quick comparisons of the nutritional value of similar packaged foods (van der Bend & Lissner, 2019).

Despite the growing adoption and purported benefits of the Nutri-Score, it has also faced criticism and sparked debate. Some studies highlight potential biases in the research supporting the Nutri-Score, as many favorable results originate from its developers or affiliated researchers (Peters & Verhagen, 2024). Furthermore, the real-world impact of Nutri-Score on purchasing behavior in supermarkets appears less pronounced compared to experimental settings (Peters & Verhagen, 2022). Another issue lies in predictive validity studies, which assess Nutri-Score's impact on health. In these studies, Nutri-Score is determined retrospectively, meaning that researchers evaluate the health benefits of a diet consisting of foods with a favorable Nutri-Score. However, this does not prove that Nutri-Score itself improves consumer health (van der Bend et al., 2022).

Independent studies have pointed out limitations in the algorithm, such as its failure to account for serving sizes (van Tongeren & Jansen, 2020) and the fact that the final score assigns greater weight to "unfavorable" nutrients compared to "favorable" ones. This approach contrasts with the latest scientific evidence, which suggests that food policies should focus more on promoting the intake of beneficial nutrients rather than merely reducing those considered harmful (Afshin et al., 2019). Another critical issue is the a priori approach of classifying nutrients and foods into rigid categories of "healthy" and "unhealthy." This method contrasts with the well-established scientific view that diet quality should be assessed as a whole rather than by analyzing individual foods. While some foods have more or fewer optimal nutritional characteristics, the best strategy for preventing or managing overweight, obesity, and non-communicable diseases is based on informed food choices and a balanced combination of foods in appropriate quantities and frequencies. Oversimplifying nutrient profiling and adopting a strict dichotomy on food healthiness should be avoided (Visioli et al., 2022). Furthermore, as an interpretative rather than an informative system, the principles behind the classification are not disclosed, meaning consumers must accept it uncritically (Carruba et al., 2021). This raises concerns about the system's effectiveness in promoting informed food choices in the long run.

FoPLs are a public health measure; as such, their target is the entire population. Therefore, limiting the approach to a purely nutritional perspective would be a mistake - it is essential to also consider the sociological and anthropological dimensions of food. Eating is not just about nutrition; it is a sensory experience that brings pleasure and is essential to human life. It also holds deep symbolic value: just as food is integrated into the body through the act of eating, a shared meal becomes a ritual of social inclusion (Fishler, 1992). Food is a central aspect of collective life and personal identity, as seen in the growing popularity of dietary choices such as vegetarianism and veganism, which are not merely dietary preferences but reflections of ethical and cultural orientations. In the past, what was "good" was also considered "healthy," but today, there is a stark opposition between pleasure and health. The radicalization of these two perspectives has led to a phenomenon known as "food anomie", a state characterized by the absence of clear food norms, resulting in uncertainty and confusion in daily choices (Fishler, 1992). A measure like Nutri-Score cannot solve such a complex issue. Nutrition cannot be reduced to mere nutrient intake, and food choices are neither strictly individual decisions nor purely rational ones (Poulain, 2002). There is a utopian aspect to the contemporary individualistic tendency that assumes every person capable of self-discipline and of making consistently informed and rational decisions. In reality, consumers face immense difficulties when making food choices, as they are constantly bombarded with health and beauty messages and an overwhelming flood of nutritional advice, often contradictory and confusing. Under these conditions, the highly praised idea of rational and individual food choice, so often championed by the scientific community, seems impractical (Fischler, 2004).

This is even more relevant for Italians: nothing defines and represents Italian identity more than food (Giannetti, 2023). For the average Italian, food is synonymous of authenticity and conviviality, which is why great attention is given to ingredient quality and seasonality, with a strong emphasis on local products and regional culinary traditions. This cultural attitude is reflected in the growing interest in practices such as chilometro zero (zero-kilometer food sourcing), solidarity purchasing groups, and traditional weekly markets, as well as in full-fledged movements like Slow Food (Koensler & Meloni, 2018).

Beyond cultural factors, the perceived healthiness and value of food play a critical role in consumer purchasing decisions. When discussing perceived healthiness, it is important to bear in mind that no single food can provide all essential nutrients, which is why dietary variety is crucial (Ministerodellasalute.it). The current scientific consensus is that there is no universal definition of food healthiness, as it can vary based on individual factors such as gender, age, metabolism, obesity, illnesses, and personal sensitivities. Consequently, a nutrient-rich food that is generally considered beneficial to health may be harmful to certain individuals. For this reason, it is more appropriate to speak in terms of an overall suitable or unsuitable diet (Plasek et al., 2020). Nevertheless, consumers tend to categorize certain foods as healthy and others as unhealthy, a distinction influenced by multiple factors, including FoPLs (Plasek et al., 2020). However, no specific studies have analyzed how Nutri-Score affects Italian consumers' perception of food healthiness.

Perceived value refers to an individual's overall assessment of a product or service based on the balance between perceived benefits and sacrifices (Yuan et al., 2020). This evaluation is shaped by numerous factors, including FoPLs (Watanabe et al., 2020). A questionnaire designed to measure perceived value consists of 18 items exploring its four dimensions: functional value, emotional value, economic value, and social value (Nguyen et al., 2015). However, no research to date has specifically examined the impact of Nutri-Score on Italian consumers' perception of food value.

Purpose of the paper. *This paper aims to investigate whether Nutri-Score affects Italian consumers' evaluation of food, considering their distinct food culture. Specifically, it seeks to determine:*

- *Whether Nutri-Score influences the perceived nutritional quality of food products.*
- *Whether Nutri-Score alters the perceived value of food items.*
- *How individual factors such as food literacy, adherence to the Mediterranean diet, chronotype, age, gender, BMI, education level,* self-assessment of diet quality, *participation in nutrition courses, and prior knowledge of Nutri-Score impact consumer evaluations.*

Methodology. *This study employed a mixed-methods approach, combining an online survey and an eye-tracking analysis. This dual methodology allowed for the collection of both subjective perceptions and objective measures of visual attention towards food products with and without the Nutri-Score label.*

Online survey

Two versions of the questionnaire were created using Microsoft Forms; participants accessed them via an online hyperlink. One version presented images of 24 packaged food products without the Nutri-Score, while the other presented the same 24 products with the Nutri-Score. The product images were sourced from online supermarket websites and digitally edited to omit the brand and add the Nutri-Score when necessary. The Nutri-Score was calculated using using the algorithm available on the Nutri-Score blog (Nutri-Score.blog) and the nutritional values provided by the CREA website (Crea.it) to obtain a general score independent of specific brand values.

The questionnaire comprised nine sections: the first two contained conditional questions, which investigated whether the participant was of legal age and whether they provided informed consent regarding privacy.

In the third section, participants' level of food literacy was assessed using the Short Food Literacy Questionnaire (SFLQ) (Krause et al., 2018). Food literacy is defined as a set of knowledge, skills, and competencies that enable individuals to plan, manage, select, prepare, and consume food in a way that meets their nutritional needs and promotes a sustainable diet over time. The SFLQ consists of 12 questions based on Likert scales (ranging from "very difficult" to "very easy" or from "strongly disagree" to "strongly agree"). Scores range from 0 to 52 and allow for classification of food literacy levels as inadequate, problematic, sufficient, or excellent.

The fourth section assessed adherence to the Mediterranean diet using the Mediterranean Diet Adherence Screener (MeDAS) (Schröder et al., 2011). This questionnaire consists of 14 questions focusing on key aspects of the Mediterranean Diet: each response that aligns with Mediterranean Diet guidelines receives 1 point, with a total score ranging from 0 to 14. Based on this, participants are classified as adherent or non-adherent to the Mediterranean diet.

The fifth section included the reduced Morningness - Eveningness Questionnaire (rMEQ) (Adan & Almirall, 1991), which evaluates participants' chronotype. Chronotype reflects an individual's preference for specific times of the day for activities or rest. The questionnaire consists of five questions, with scores ranging from 4 to 25, classifying participants into evening, intermediate, or morning types.

Sections six and seven focused on the study's endpoints: perceived healthiness and perceived value. Perceived healthiness was assessed through the question, "How healthy do you think this product is?" with a five-level response scale, corresponding to the five Nutri-Score's classes.

Regarding perceived value, the standard questionnaire was not used, as it contains 18 questions that would have had to be repeated for each of the 24 food products presented, making the process excessively long and demanding for participants. Instead, based on Konuk's (2019) study, which suggests that consumers tend to assign higher prices to products they perceive as more valuable, participants were asked to estimate the cost of each food product.

In the eighth section, the following data were collected: age, gender, weight, height, education level, self-assessment of diet quality, attendance at nutrition courses, and prior knowledge of Nutri-Score.Eye-tracking

The Tobii Pro Spark eye-tracker was used to record participants' eye movements. Two experimental designs were created using Tobii Pro Lab software, mirroring the online survey: one presenting the 24 food product images with Nutri-Score and the other without.

Each participant received a brief explanation of the task, and then the instrument was calibrated. Afterwards the actual experiment began: every image was displayed for eight seconds, followed by automatic progression to the next stimulus in a randomized order. Since the Tobii Pro Lab software does not support multiple-choice responses, questions were asked verbally. This limitation led to the decision to focus solely on perceived healthiness assessment, using a rating scale from 1 to 5 - the evaluation of perceived value was deemed too cognitively demanding.

After the eye-tracking session, participants completed an online questionnaire, identical to the main survey but excluding the perceived healthiness section.

Statistical Analysis

Data analysis was performed using the statistical software "R". For continuous variables - age, BMI, numerical scores from SFLQ, MeDAS, and rMEQ, and the perceived value of food products - the Kruskal- Wallis test was applied. For categorical variables - gender, education level, participation in nutrition courses, self-assessment of diet, prior knowledge of the Nutri-Score, categorical results from SFLQ, MeDAS, and rMEQ, and perceived healthiness of food products - the chi-square test was used. Linear models were analyzed using the t-test and F-test. Data from the eye-

tracking experiment were analyzed using the Welch Two Sample t-test. Results were considered significant when the p-value was < 0.05.

Results. *The research findings from both the online survey and the eye-tracking analysis provide insights into the impact of Nutri-Score on the evaluation of food products by the Italian population.*

Online Survey Results

*A total of 204 participants completed the online survey, of which 101 completed the survey without Nutri-Score (no-NS) and 103 the one with Nutri-Score (NS). The profiling was generally homogeneous between the two groups, with the only significant difference observed in self-assessment of diet-the group that completed the no-NS questionnaire rated their diet significantly better (p-value = 0.008***). This likely results from the disparity in nutrition-specific education between the two groups, which is near the threshold of significance (p-value = 0.068): in the no-NS group, 49% of participants attended nutrition courses, compared to 35% in the NS group. One might expect food literacy to be significantly different as well, but this was not the case. A possible explanation lies in the generally higher age of the no-NS group (p-value = 0.084), which may "mask" the food literacy levels of younger participants. This hypothesis is supported by the significant negative association between age and nutrition course attendance, as well as between age and SFLQ scores.*

*As far as perceived healthiness is concerned, the NS group's responses reveal that, although the presence of the Nutri-Score might suggest that healthiness evaluations would be immediate, only 31.2% of responses assigned a healthiness level consistent with the Nutri-Score. Furthermore, trust in the Nutri-Score varied based on product classification. For products rated A or B, only 26% of participants assigned a matching healthiness rating, whereas for products rated D or E, this percentage increased to 38%. After these initial observations, we sought to answer one of the main research questions: whether the Nutri-Score influences the perception of food healthiness among the Italian population. Significant differences between the two groups were recorded for 5 out of 24 products, specifically for salmon (p-value = 0.009**), dark chocolate (p-value = 0.008**), Parmigiano (p-value = 0.023*), bell peppers (p-value = 0.022*), and walnuts (p-value = 0.037*). For the first three, which had a negative Nutri-Score, negative healthiness ratings in the NS group increased by 20% for salmon and dark chocolate and by 13% for Parmigiano. Similarly, there was an increase in positive ratings for walnuts and bell peppers, by 18% and 13%, respectively. However, given that these significant differences were limited to a small subset of products, the overall impact of Nutri-Score on perceived healthiness in the online survey was not considered substantial.*

Regarding the perception of value, a statistically significant difference between the two groups was found for only one product: walnuts, with the no-NS group attributing a significantly higher price. This isolated finding suggests that the Nutri-Score did not influence how Italian consumers estimated the price of packaged foods in this study.

Eye-Tracking Results

A separate sample of 53 participants took part in the eye-tracking experiment, of which 26 took part in the experiment without Nutri-Score and 27 in the one with Nutri-Score. *The two groups were homogeneous in terms of sociodemographic characteristics and the results of the SFLQ, MeDAS, and rMEQ questionnaires.*

Only 31.5% of responses in the NS group assigned a healthiness level consistent with the label, and the overall perception of healthiness did not significantly differ between the two groups. The analysis of gaze metrics revealed that the average number of fixations on the product (p-value = 0.070) or the average duration of these fixations (p-value = 0.550) were not significantly different between the two groups. Within the Nutri-Score group, the average number of fixations on the Nutri-Score label was significantly lower than the average number of fixations on the product itself (p-value < 0.001), suggesting that, when making healthiness judgments, participants considered the product as a whole rather than focusing on the Nutri-Score.

*By constructing a linear model with perceived value and chronotype, and considering the average price assigned by participants with an intermediate chronotype as the intercept, it was observed that in the NS group, morning-type individuals assigned a significantly higher price (p-value = 0.020), while evening-type individuals showed a tendency to assign a lower price (p-value = 0.094). In contrast, in the group without Nutri-Score, evening-type participants assigned a significantly higher price compared to the intercept (p-value = 0.014.**). This result was not correlated with other individual variables. To further explore this difference, an additional linear model was constructed, including the time at which the questionnaire was completed. It was found that in the NS group, evening-type participants completed the questionnaire significantly later. A more detailed examination of raw data showed that evening-type participants in the NS group responded on average around 6 PM, while those in the group without the Nutri-Score responded around 2 PM. Assuming that evening-type participants have lunch after 2 PM, it could be hypothesized that the perceived price is higher at 2 PM due to hunger and lower at 6 PM because they are already satiated. The relationship between the Nutri-Score, chronotype, and perceived value is particularly interesting and deserves further investigation. However, the data collected in this study are not sufficient to fully explain the observed results.*

Research limitations. *The findings of this study provide valuable insights into the impact of Nutri-Score in the Italian context; however, several limitations must be considered when interpreting the results.*

First, the sample composition is not fully representative of the Italian population. In the online survey, approximately 80% of participants were female, the average age in both methodologies was relatively low, and most

participants held advanced academic degrees. Additionally, around 40% of online survey respondents attended nutrition-related courses, which may have influenced their perceptions.

Another limitation concerns the methodologies used. Online questionnaires rely on self-reported data, which can be affected by cognitive biases or inaccuracies in recalling dietary choices. Moreover, it is not possible to fully control experimental conditions in an online setting. In contrast, the use of eye-tracking technology ensures controlled conditions but is limited in the number of variables that can be analyzed and the sample size. These two methodologies are therefore complementary, each addressing certain limitations of the other.

Finally, the study was conducted in an experimental setting using images of food products rather than a real-world purchasing environment. This artificial context may have influenced the naturalness of participants' responses and the actual impact of Nutri-Score on their consumption decisions.

Given these limitations, future research should aim to test Nutri-Score with more representative samples of the general population. Additionally, efforts should be made to enhance experimental control in online questionnaires, for example, by restricting access to desktop devices to ensure a clearer view of the presented images. Furthermore, testing Nutri-Score in real purchasing contexts would provide a more accurate understanding of its influence on consumer behavior.

Managerial implications. *The findings of this study have several potential implications for policymakers, food manufacturers, and retailers operating in the Italian market and other regions with strong culinary traditions.*

The results suggest that Nutri-Score may have a limited impact on Italian consumers' evaluations of food healthiness and value, indicating that its effectiveness as a standalone tool is questionable. Policymakers considering its mandatory adoption should recognize that relying solely on Nutri-Score, without complementary strategies, may not achieve the desired public health outcomes. Eye-tracking data further reveal that Italian consumers primarily focus on the food product itself rather than the Nutri-Score label when assessing healthiness. This suggests that intrinsic product characteristics-such as familiarity, perceived quality, ingredients, and brand (even though brands were excluded in this study)-may carry more weight than a summary nutrition label. Additionally, an unexpected finding regarding chronotype suggests a potential interplay between biological rhythms, satiety levels, and price sensitivity in shaping value perceptions. While this relationship requires further investigation, it raises interesting possibilities for retailers and marketers regarding the timing of consumer engagement with nutrition labels and pricing information. However, implementing broad market strategies based on chronotype would be challenging. Finally, the study highlights the critical role of cultural context in shaping food-related decisions. In Italy, where culinary traditions are deeply ingrained, consumers may rely less on simplified labels and more on detailed product information, origin, and preparation methods. Efforts to promote healthier eating should account for these cultural nuances, emphasizing comprehensive food education that empowers consumers to make informed choices based on multiple factors rather than a single front-of-pack label.

Originality of the paper. *This paper contributes to the existing body of knowledge on FoPLs and consumer behavior in several original ways. It addresses a gap in the literature by examining how a standardized nutrition label interacts with the Italian cultural context, where culinary traditions, local ingredients, and the social aspects of eating play a significant role in food choices. Also, the study employs a combined methodological approach, integrating an online survey with an eye-tracking analysis. This mixed-methods design offers a more comprehensive understanding of Nutri-Score's effects by combining subjective perceptions of healthiness and value with objective measures of visual attention toward both food products and the label itself.*

Key words: *Nutri-score; consumer neuroscience; Italian population; perceived healthyness; perceived value; eye-tracker; survey.*

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Consumer (mis)perception of sustainable behaviors: Insights for energy usage and food consumption*

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Abstract

In this research, we provide insights into why consumers struggle to adopt high-impact sustainable behaviors in two particular domains: energy usage and food consumption. We conducted two studies using a mixed-method approach that combines quantitative and qualitative research techniques. More particularly, Study 1, an online survey with 347 Italian consumers, revealed that sustainability has a marginal relevance to consumers' decisions and behaviors and that consumers' perceptions about the pro-environmental impact and sacrifice needed to perform certain behaviors is misaligned with actual impact and effort. Study 2, consisting of 12 in-depth interviews with experts and consumers, delved deeper into consumers' perception and indicated laziness as a critical barrier to consumers' engagement in sustainable behaviors. Our findings carry significant implications for policymakers and companies regarding how to make sustainable options and solutions more accessible and easier to perform as a way to increase the salience of sustainability and overcome the cognitive barrier of laziness.

Framing of the research. *Environmental sustainability has become a priority in economic policies and corporate strategies (Goedertier et al., 2024) and encouraging consumers to engage in sustainable behaviors is an imperative (White et al., 2019). Yet some factors may still prevent consumers from engaging in such behaviors. These include the so-called attitude-behavior gap, whereby consumers do not act upon their pro-environmental attitudes, and a possible misperception of the pro-environmental impact of their environmentally friendly actions, in terms of CO_2 emission mitigation potential (Johnstone & Tan, 2015; White et al., 2019). Indeed, sustainable behaviors may substantially differ in this respect. Previous studies (Ivanova et al., 2020; Lembregts and Cadario, 2024) highlight how certain behaviors, such as reducing transportation via plane, avoiding car usage, or transitioning to plant-based diets, have significantly higher CO_2 emission mitigation potential compared other behaviors that, despite their limited pro-environmental impact, are regularly promoted among consumers (e.g., recycling; Catlin and Wang, 2013). Furthermore, behaviors with a low CO_2 emission mitigation potential have also attracted more research attention than those with higher potential (Lembregts and Cadario, 2024).*

High-impact behaviors typically face significant psychological, social, and cultural barriers. Consumers often struggle with the adoption of sustainable behaviors due to cognitive biases (Trudel and Cotte, 2009), emotional resistance (Tanțău and Gavrilescu, 2019), or future discounting (Kempton et al., 1995). Social and cultural norms can shape consumers' choices, and cultural inertia may induce people to indulge in high-consumption lifestyles, making underconsumption socially abnormal (Majer et al., 2021). In addition, misinformation and companies' greenwashing practices also contribute to distrust in environmental claims (Yadav et al., 2019), while sustainability metrics are often too technical, leading to consumer disengagement (Cadario et al., 2016; Pandalaere et al., 2011). Lastly, consumers feel constrained by external and infrastructural factors that may discourage their willingness to engage in sustainable behaviors. Examples include high perceived cost of sustainable options (Elmor et al., 2024), lack of sustainable infrastructures like charging stations for electric vehicles (Axon, 2017), and insufficient incentives (Bazerman and Hoffman, 1999). These barriers can also make consumers feel depowered even when motivated by several drivers that

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could facilitate the adoption of sustainable behaviors (Casalegno et al., 2022; Doell et al., 2021; McDonald et al., 2015; Jain et al., 2021).

Purpose of the paper. *Given the aforementioned complexities, promoting sustainable consumption behaviors remains challenging for policymakers and companies. Therefore, this research aims to provide insights into why consumers struggle to adopt high-impact sustainable behaviors in two domains: energy usage and food consumption. The research contributes to explaining why consumers can be reluctant to adopt certain high-impact behaviors, despite their environmental awareness. By assessing perceived effort and mitigation impact, we identify some leverage points for increasing sustainable behavior adoption, which could inspire interventions that make sustainable behaviors more accessible, desirable and intuitive.*

Our research adopts a mixed-methods approach. More particularly, we first administered an online survey to a sample of Italian consumers (Study 1); then we conducted several in-depth interviews to triangulate the preliminary evidence from the literature review process (Study 2).

Study 1 - Methodology. *We administered a structured survey on a sample of 347 Italian consumers. Their socio-demographic profile, in terms of age (M_{age} = 43.17, SD_{age} = 13.23; 29.4% aged 18-34, 31.4% aged 35-49, 39.2% aged 50 and older) and gender distribution (51% males, 48% females, 1% third gender), was not substantially different from that of the general population of reference (ISTAT, 2024), thus ensuring an acceptable level of representativeness of the sample.*

We created two versions of an online questionnaire, one related to the energy usage domain, including some aspects related to how people use means of transportation (Ivanova et al., 2020), while the other version regarded food consumption. The questionnaire started with an open-ended question on the main motives and drivers influencing energy usage and food consumption, depending on the assigned version; two open-ended questions aimed at identifying, respectively, promotive sustainable behaviors (i.e., actions that people should do to exert a positive impact on the environment; e.g., prefer public transportation options over driving a private car) and preventive sustainable behaviors (i.e., actions that people should avoid to inhibit negative environmental consequences; e.g., avoid long-distance flights) (Winterich et al., 2024). The questionnaire also included a list of 32 items centered on 16 behaviors that, according to prior research (Ivanova et al., 2020; Lembregts and Cadario, 2024; Winterich et al., 2024), were identified as having the highest potential for CO_2 emissions mitigation. For each behavior, respondents were asked to indicate the perceived impact in terms of CO_2 emission mitigation potential, and how difficult it could be to adopt the behavior; the scores on this scale were reversed so that higher values indicated greater perceived effort. We then collected socio-demographic data (e.g., gender and age).

Study 1 - Results on energy usage. *One hundred seventy-one respondents participated in the energy usage survey. A thematic analysis was conducted by two coders (percentage of simple agreement = 93.08%; Cohen's k = 0,77 on the total motives) on the responses relative to motives and drivers that could influence consumers' choices regarding energy sources and means of transportation. The results showed that 76% of respondents cited motives unrelated to sustainability (e.g., cost, comfort, wellbeing), while only 24% mentioned sustainability-related concerns (e.g., avoiding waste, reducing environmental impact). When asked about promotive and preventive behaviors, respondents primarily mentioned low-impact, accessible actions (e.g., reducing domestic energy waste, using renewables), thus deprioritizing higher-impact but more effortful behaviors.*

Similar themes emerged in participants' rating of the perceived impact, in terms of CO_2 emission mitigation potential, and effort associated with the 16 examined behaviors (Ivanova et al., 2020; Lembregts and Cadario, 2024). Participants rated adopting active mobility like walking or cycling (M = 5.90, SD = 1.32), using renewable energy (M = 5.89, SD = 1.19), and heating from renewables (M = 5.68, SD = 1.30) as having high mitigation potential, though minimizing air travel (M = 5.08) was underestimated compared to its actual impact. Consistent with the literature (Ivanova et al., 2020), participants perceived the action of minimizing traveling by plane as having a moderately high impact (M = 5.08, SD = 1.53), despite the behavior's real higher impact. Participants then ranked the same behaviors according to the perceived effort required for adoption. Autonomous production of renewable energy (M = 4.95, SD = 1.71), the improvement of home energy efficiency through renovations (M = 4.57, SD = 1.71), and car use avoidance (M = 4.50, SD = 1.88) were perceived as the most effortful for consumers. These findings are probably associated with the accessibility of these solutions, especially in residential areas such as small villages or towns, where limited accessibility can serve as a critical barrier to adoption. A key takeaway is the misalignment between perceived impact and effort, where impactful behaviors are seen as too difficult to adopt, contributing to the attitude-behavior gap. These findings suggest areas policymakers can target to promote sustainable behaviors more effectively.

Study 1 - Results on food consumption. *One hundred seventy-six respondents participated in the food consumption survey. A similar thematic analysis on the responses relative to motives and drivers that could influence consumers' choices (percentage of simple agreement = 93.08%; Cohen's k = 0,77 on the total motives) revealed that 82% of respondents cited motives unrelated to sustainability (e.g., personal taste, nutrition, health), while only 18% mentioned sustainability-related reasons, proving once again that sustainability is not a primary driver in food choices (Winterich et al., 2024). When analyzing promotive and preventive behaviors, we found that respondents display a knowledge gap regarding high-impact CO_2 emissions mitigation strategies. Participants mostly mentioned accessible but lower-impact*

behaviors, such as preferring eco-friendly packaging when purchasing food, while high-impact behaviors like adopting a vegan diet were rarely recalled.

Respondents also showed discrepancies when dealing with the perceived impact and effort associated with sustainable food choices. They considered avoiding red meat consumption (M = 4.67, SD = 1.73), adopting a vegetarian diet (M = 4.33, SD = 1.59), following a Mediterranean diet (M = 4.20, SD = 1.47), and adopting a vegan diet (M = 4.19, SD = 1.83) as moderately impactful. Interestingly, while research indicates veganism as one of the most effective behaviors for CO_2 mitigation, adopting a vegan diet was ranked as the least impactful behavior in the domain of food consumption. However, regarding the perceived sacrifice required to engage in sustainable food consumption, respondents considered adopting a vegan diet (M = 4.70, SD = 1.89) as the most demanding behavior in terms of personal effort, while avoiding red meat consumption and adopting a Mediterranean diet were considered relatively effortless (respectively M = 3.42, SD = 1.86; and M = 2.46, SD = 1.54). The key takeaway is the misalignment between the perceived impact and sacrifice when engaging in sustainable food choices, as the most effective behaviors are also perceived as the most difficult to adopt. This discrepancy constitutes a barrier per se, thus contributing to the attitude behavior gap

Study 2 – Methodology. *To deepen our understanding of consumer attitudes toward and engagement in sustainable consumption, we conducted semi-structured, in-depth interviews (Arsel, 2017). We gathered insights from informants recruited through the convenience sample technique. Previous research has highlighted the existence of knowledge gaps between consumers and experts on sustainability regarding CO_2 emissions reduction and necessary behavioral changes to address climate change (Winterich et al., 2024). To tackle this point, we further recruited a smaller sub-sample of informants whose job, broader professional interest, and background could provide ulterior insights, less accessible to laypeople. Twelve informants constituted our final sample, eight consumers and four experts in sustainability and climate change. The mean age of informants was 37.58 years (age range: 23-63). Regarding socio-cultural characteristics, we selected individuals with different backgrounds to collect meaningful insights on the topic of interest. We conducted all the interviews between December 2024 and January 2025, upon obtaining informed consent from informants. Since our informants were Italian, we translated the verbatim responses into English while preserving their intended meanings, even when originally expressed in a different language. To decode the interviews, we performed an inductive thematic analysis (Braun and Clarke, 2006) to identify patterns (hereafter, themes) within the interviews.*

Study 2 – Preliminary insights. *Findings revealed a complex interplay between values, attitudes, subsequent behaviors, and structural constraints in sustainable consumption. Informants predominantly associated sustainability with vivid natural imagery, often contrasting it with consumerist excess. However, skepticism toward institutional practices and policies emerged, with some informants perceiving regulations and norms as performative rather than transformative. A key tension surfaced between individuals' willingness to engage in sustainable behaviors and the related perceived inaccessibility of such, driven by perceived economic barriers, cultural disbelief, and perceived lack of agency. Most informants framed sustainable choices as an ingrained habit shaped by previous experiences, others acknowledged the existence of cognitive dissonance, as they value sustainability but, at the same time, struggle to align their behaviors accordingly.*

One of the most interesting, yet under-investigated, psychological barriers to sustainable consumption that emerged from this analysis is laziness. *Informants described laziness as a threefold concept: lack of willingness to make an effort, that is, the perception of being able to make sustainable choices and, at the same time, the lack of motivation or willingness to change their rooted habits. Also, they emphasized the inherent sacrifice of adopting sustainable behavior, a sort of "*sunk cost of sustainability*", that is, a diffused belief that sustainable behaviors are inconvenient or requiring too much effort, making people less likely to adopt them. Lastly, some informants recognized their* inertia, *framed as the need for sustainable actions while finding themselves stuck in old habits due to a lack of immediate incentive to change. Especially in context of resource scarcity and ego depletion, even informed consumers default to unsustainable choices due to this intrinsic laziness. However, some informants suggested that behavior change could be facilitated through habit formation and stacking, gamification, and positive reinforcement, making sustainability more accessible and integrated into daily routines.*

Study 2 – Insights on energy usage. *When dealing with the topic of energy usage, informants exhibited varying levels of commitment, often expressing contradictions between intentions and subsequent behaviors. While some of them said that they actively transitioned to renewable energy sources, many acknowledged the existence of knowledge gaps impeding an informed decision-making process. For instance, informants often recalled the recurring barrier related to the misalignment between their willingness to shift to sustainable energy sources and the perceived feasibility of this option. While they mostly reported minor sustainable actions (such as turning off unnecessary lights at home, thus minimizing their energy consumption), they simultaneously maintained behaviors that are counterproductive to conservation efforts. A recurring theme was the prioritization of comfort over efficiency, especially reported by informants who prefer excessive indoor heating in winter, despite the waste of energy. This contradiction highlights the attitude-behavior gap, as well as the role of structural constraints (even on a perception level) in shaping consumer choices. On the other hand, experts emphasized the need for structural improvements on infrastructures to ensure a smooth transition to sustainable consumption patterns. For instance, experts stressed the importance of decentralized*

energy solutions, pointing out the potential of innovations like solar panels and microgrids to reduce reliance on fossil fuels. However, they also emphasized how individual behavior change alone is insufficient, as systemic interventions, regulatory incentives, and public awareness campaigns are fundamental for large-scale adoption. According to experts, policies should frame energy conservation as practical, convenient and desirable rather than restrictive and sacrificing, ensuring that sustainable behaviors are positioned as default instead of exceptional choices.

Study 2 – Insights on food consumption. *When dealing with food consumption, informants often view sustainability as an aspiration, deprioritized in favor of more tangible aspects of consumption, such as concern for one's personal health, convenience, and affordability. Many informants, for instance, expressed their preference for local and minimally processed foods, yet their choices were primarily motivated by health concerns rather than environmental considerations. A significant knowledge gap emerged regarding the most effective CO_2 mitigation strategies. While informants frequently recalled episodes related to the adoption of lower-impact actions (e.g., reducing plastic packaging when grocery shopping), higher-impact changes such as adopting a vegan or plant-based diet were rarely mentioned. When mentioned, higher-impact behaviors were perceived as too effortful. This misalignment between perceived impact and actual impact mirrors findings in energy conservation, as informants prioritized actions that feel actionable and easy rather than those that offer the greatest environmental benefit.*

Food choices are also impacted by economic constraints, which emerged as a major barrier to the shift to sustainable consumption patterns. Informants acknowledged the higher cost of sustainable products, limiting their ability to prioritize eco-friendly options. The dietary needs further complicated decision-making, as informants who considered themselves as environmentally conscious still felt constrained by health requirements, reinforcing the multimodal nature of sustainability barriers, consistently with the literature. On this end, experts emphasized how sustainability in food consumption extends beyond individual choices, requiring systemic changes in food production, distribution, and waste management. They also highlighted the importance of strategies such as meal planning to reduce food waste and prioritizing seasonal ingredients, considered effective approaches. However, experts also emphasized the importance of institutional interventions, considered necessary to make sustainable food practices economically viable for the majority of consumers.

Research limitations. *The two studies present some limitations that pave the way for future research. More particularly, Study 1 is limited to self-reported, correlational data. Therefore, future research could delve deeper into the role of perceived impact and effort by implementing experimental designs. Second, while our goal was to shed light on Italian consumers' attitudes and behaviors, future research could investigate samples from other populations to increase our results' generalizability. Study 2 adopted a qualitative approach that allowed us to bring intriguing constructs (e.g., laziness) to light. Future research could build on our insights to design experimental studies and then solid evidence-based interventions.*

Managerial implications. *Given the persistence of attitude-behavior gap and the misalignment between individuals perceived and actual mitigation potential through their behavior, organizations could design interventions that are able to bridge that gap, thus enhancing consumer engagement in sustainable behavior. From a company perspective, reframing sustainability as effortless and desirable is a key lever. As proved by our two investigations, consumers default to convenient choices, therefore sustainable options should be framed as significantly more accessible and rewarding. Moreover, and in a related vein, businesses need to bridge the gap between perceived sacrifice and impact by educating consumers on the actual environmental benefits of their choices, while simultaneously lowering the perceived barriers through effective communication. Given the role played by laziness in creating ingrained behaviors based on inertia, companies could leverage behavioral nudges, habit formation and staking, and gamification to encourage incremental changes and help consumers visualize environmental progress. Also, tackling consumer skepticism is necessary to contrast greenwashing concerns and improve trust. Brands, in particular, should ensure transparency through accessible, clear, science-backed sustainability metrics, also partnering with authoritative third parties (e.g., associations supporting environmental actions, experts, and figures like popularizers) who can authentically communicate environmental commitments and facilitate consumers' understanding of their actions' impact.*

Based on our findings, addressing economic and structural changes is also crucial, as affordability and feasibility still remain major constraints. Policymakers need to align sustainability incentives with consumer priorities, thus making sure that financial and infrastructural interventions facilitate behavioral transitions. For instance, regulatory bodies could support consumers with short-term interventions like subsidies or tax incentives, to allow them to smoothly transition to sustainable options while ingraining sustainable behaviors in their routine. Moreover, large-scale communication campaigns, supported by media and opinion leaders, could drive a broader change in societal norms by framing sustainable consumption patterns as aspirational and desirable, rather than as obligations to which we must conform. Investment in infrastructures (such as expanding public transportation network, increasing in number vehicle charging stations, and supporting local food supply chains) is essential to remove practical barriers and to enhance the (perceived) accessibility and affordability of sustainable options.

Lastly, a holistic approach is more than necessary. Companies should aim at simplifying and normalizing sustainable consumption, while policymakers should create the systemic conditions that make sustainability the default choice, thus bridging the gap between sustainability ideals and real behaviors and making sustainable consumption an effortless practice.

Originality of the paper. *This study extends existing literature by focusing on high-impact sustainable behaviors and exploring the cognitive and structural barriers that prevent their adoption. By integrating different research methods, this study provides a comprehensive understanding of consumer sustainable decision-making.*

Keywords: *sustainability; sustainable consumption behavior; CO2; mitigation; energy usage; food consumption.*

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Does seniors' co-creation enhance acceptance of digital public services? A conceptual model

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Abstract

The rapid digitalization of public services, accelerated by the COVID-19 pandemic and driven by the EU's Digital Decade targets, has intensified the risk of digital exclusion for older adults, who frequently face cognitive, physical, and digital literacy barriers. This study proposes a conceptual model that integrates value co-creation theory with technology acceptance frameworks to explore how participatory service design can support senior citizens' adoption of digital public services. We argue that co-creation may reduce technology anxiety, enhance perceived social support and digital self-efficacy, and positively influence perceived usefulness (PU) and ease of use (PEOU)-key determinants of technology acceptance. By reframing older adults as active participants in service development, the model addresses a critical gap in public service design literature. It offers a theoretical foundation for investigating how participatory approaches can promote more accessible and responsive digital services.

Framing of the research. *The digitalization of public services has undergone rapid and transformative acceleration, particularly in response to the COVID-19 crisis. Far from being a purely technological shift, this evolution reconfigures the relationship between governments and citizens, positioning digital public service delivery as a core mechanism of welfare provision.*

Within this broader evolutionary trajectory, the EU's Digital Decade Initiative has set a clear objective: to ensure full online accessibility of all essential public services by 2030 (Virnandes et al., 2024). Yet, the success of this agenda depends not only on infrastructure and technological capacity but also on the extent to which digital systems promote equitable access and avoid deepening social divides (Virnandes et al., 2024; Vilpponen et al., 2020).

Older adults are especially at risk of exclusion in this context. They often face intersecting challenges, including physical limitations, cognitive decline, and low levels of digital literacy (Chan and Chen, 2014; Wu et al., 2025). These are further exacerbated by psychological barriers such as anxiety around technology use, diminished confidence, and limited access to support networks (Chan and Chen, 2014). Poor interface design, low usability, and inadequate accessibility standards contribute to these difficulties (Charmarkeh, 2017), particularly in domains where digital interaction is not optional but required-such as healthcare, welfare, or taxation. In such cases, the digital shift risks marginalizing those least equipped to navigate it (Lee and Coughlin, 2015).

The urgency of addressing this risk is heightened by Europe's demographic outlook. According to Eurostat (2024), individuals aged 65 and over are projected to represent nearly 30 percent of the EU population by mid-century, with the 80-plus segment growing even more rapidly. While recent policy frameworks have recognized the need for inclusive, user-centred service design (OECD, 2022), implementation across Member States remains uneven. For example, Italy continues to underperform on key digitalization metrics, with service availability and citizen uptake significantly below the EU average (European Commission, 2023).

In response to these systemic gaps, a growing body of scholarship identifies value co-creation as a promising lever for public service inclusion (Acar et al., 2023; Rodríguez Müller et al., 2021; Voorberg et al., 2015). By involving users directly in the design, implementation, and evaluation of public services, co-creation may enable more responsive and equitable systems-especially for marginalized or digitally excluded groups. Among older adults, participatory approaches are associated with increased perceptions of usefulness, enhanced digital confidence, and stronger alignment between services and everyday needs (Mergel et al., 2025; Morte-Nadal and Esteban-Navarro, 2025). Recognized in major policy frameworks (OECD, 2022), co-creation is increasingly framed as an operational principle of inclusive digital transformation.

Despite its conceptual appeal and growing policy recognition, the actual impact of co-creation in digital public service delivery remains insufficiently substantiated. As highlighted by Voorberg et al. (2015), empirical evidence on the effectiveness of co-creation is mixed, and many of its assumed benefits remain theoretically compelling but empirically

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underexplored. This underscores the need for deeper conceptual inquiry into the conditions under which co-creation can meaningfully contribute to more accessible and age-inclusive digital services.

At the same time, research on e-government and public service adoption has largely relied on established technology acceptance models, including the Theory of Reasoned Action (Ajzen, 1991), the Technology Acceptance Model (TAM) (Davis, 1989), and its extensions-TAM2, TAM3 (Venkatesh and Davis, 2000; Venkatesh and Bala, 2008), and UTAUT (Venkatesh et al., 2003).

To address these limitations, the Senior Technology Acceptance Model (STAM) (Chan and Chen, 2014) expands the traditional framework by incorporating psychosocial variables-including technology anxiety, self-efficacy, and social support-offering a more realistic account of older adults' digital engagement. Building on STAM, this study explores how these psychological dimensions can be influenced by participatory design processes. Specifically, it conceptualizes co-creation as a potential mechanism for mitigating psychological barriers and enhancing older adults' acceptance of digital public services (Rodríguez Müller et al., 2021; Voorberg et al., 2015).

Purpose of the paper. *This study engages with a timely research priority in public service innovation by proposing a conceptual model that explores how co-creation may influence older adults' adoption of digital public services. The model brings together insights from value co-creation theory (Vargo and Lusch, 2008; Vargo et al., 2020) and technology acceptance frameworks-most notably the TAM (Davis, 1989) and the STAM (Chan and Chen, 2014).*

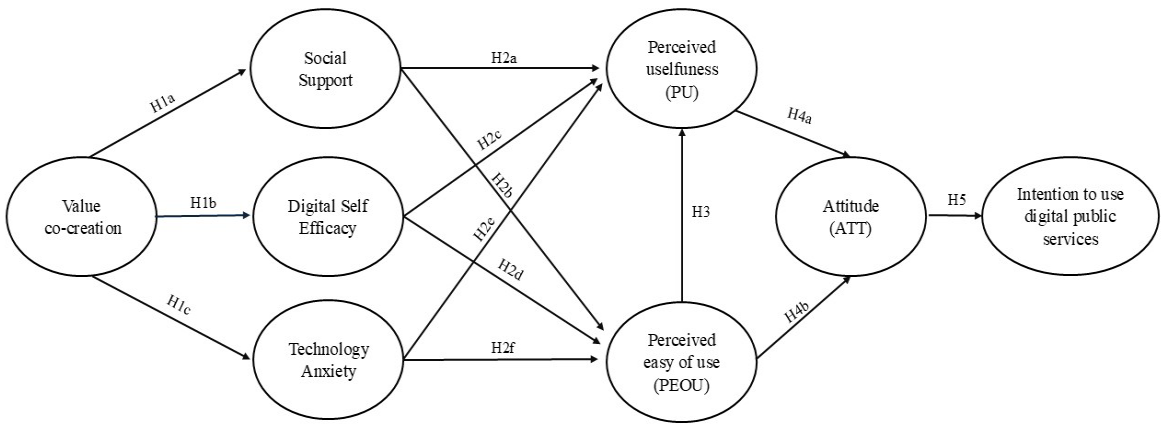
The core objective is to examine whether, and to what extent, involving older adults in co-creation processes can reduce technology-related anxiety, enhance digital self-efficacy, and improve perceived usefulness (PU) and perceived ease of use (PEOU)-key antecedents of technology acceptance. In this way, the model repositions older users not merely as recipients of digital services but as active contributors to their design and delivery, shifting the focus from provider-led digitalization to participatory inclusion.

Methodology. *This explanatory study develops an integrative conceptual model that links value co-creation processes (Vargo and Lusch, 2008; Vargo et al., 2020) with established technology acceptance frameworks (Davis, 1989; Venkatesh et al., 2003; Chan and Chen, 2014), focusing on older users of digital public services. The model emerges from a critical synthesis of interdisciplinary literature in public administration, service management, and information systems. It positions co-creation as a potential mechanism for reducing psychological barriers-such as technology anxiety, low digital self-efficacy, and limited social support-and explores their role in shaping perceptions of usefulness, ease of use, and adoption intention among elderly people. This form of theory-building is consistent with prior conceptual contributions that seek to integrate fragmented insights and identify pathways for empirical validation (Tarhini et al., 2016).*

The conceptual model developed in this study serves as a foundation for future research and hypotheses testing. In particular, future methodological developments include the direct involvement of older adults through the administration of surveys and interviews. The information and data collected will be used to test the research hypotheses using structural equation modelling. In this regard, Appendix A presents a preliminary version of the survey that we intend to administer to measure the main constructs of the conceptual model, which will be used to test the research hypotheses. Each construct is measured using items adopted from prior studies and revised to align with the objectives of the current research.

Research model and hypotheses development. *Building on the conceptual foundations outlined above, figure 1 presents the proposed model, which is followed by the formulation of research hypotheses.*

Fig. 1: The conceptual model



Co-creation and psychological barriers

The effect of co-creation on social support

Co-creation takes place in socially embedded environments where users interact, exchange knowledge, and collaborate in solving problems (Vargo et al., 2008). Such collaborative settings in public service contexts strengthen social skills through sustained interactions with professionals and peers (Acar et al., 2023; Edelmann, 2022; Mergel et

al., 2025), and contribute to a stronger perception of being supported and guided-particularly among users who may experience isolation or uncertainty in digital environments (Farr, 2019). These interactions foster belonging, reciprocity, and emotional connection, which are widely recognized as core components of perceived social support (Liu et al., 2020). Park et al. (2019) conceptualize social support as an operant resource that becomes activated (Zimmerman, 1951) through co-creative engagement in online service environments. Referring to the typology developed by Cutrona and Russell (1990), the authors identify emotional, informational, esteem-based, and network-related support as distinct forms of social value that are not inherent to the service itself but emerge progressively through user participation. These resources represent a key experiential outcome of value co-creation. Based on this evidence, we hypothesize that co-creation positively influences perceived social support.

H1a. Co-creation reinforces perceived social support.

The effect of co-creation on digital self-efficacy and technology anxiety

Co-creation is further expected to empower citizens by providing a platform to voice their needs, contribute to service improvements, and actively participate in decision-making processes (Jo and Nabatchi, 2018). This approach is particularly valuable for vulnerable groups, as it supports capacity-building and facilitates technology adoption when accompanied by appropriate professional support (Verschuere et al., 2018): when resourceful and vulnerable citizens collaborate in co-creation, it promotes inclusivity and helps reduce digital exclusion (Robert, et al., 2020; Verschuere et al., 2018).

Acar et al. (2023) show that co-creation fosters self-development by engaging citizens in learning processes related to service design and implementation. Park et al. (2019), instead, emphasize its role in enhancing self-efficacy and stimulating the generation of new ideas. These experiences enhance users' sense of competence and control in digital environments.

Moreover, public service co-creation typically unfolds in socially supportive learning contexts where users can ask questions, receive feedback, and gain reassurance (Verschuere et al., 2018; Robert et al., 2020). The presence of professional guidance and peer interaction contributes to lowering emotional barriers and increasing users' confidence in using digital tools.

Therefore, we expect that co-creation, by enhancing capacity and psychological readiness, will increase digital self-efficacy and reduce technology anxiety.

H1b. Co-creation reinforces digital self-efficacy.

H1c. Co-creation reduces technology anxiety.

Psychological barriers and PU and PEOU

The effect of social support on PU and PEOU

Social support-whether provided by family members, peers, or institutional programs-has been widely recognized as a key facilitator of technology adoption among older adults (Chen and Chan, 2014; Czaja et al., 2018; Vaportzis et al., 2017). Support systems assist seniors in navigating digital environments, resolving technical challenges, and building digital literacy, thereby alleviating technology-related anxiety and enhancing digital self-efficacy (Kim and Yang, 2024).

Empirical research indicates that social support has a positive influence on both PU and PEOU by offering practical assistance and emotional reassurance (Czaja et al., 2018). Song et al. (2022) found that seniors who received help from family members or caregivers were more likely to perceive digital health services as useful and user-friendly, underlining the value of intergenerational digital support. Similarly, Meijer (2012) showed that community-based digital training initiatives reduce resistance to e-government platforms by building trust and increasing digital confidence.

Based on this evidence, higher levels of social support are expected to enhance older adults' confidence in using digital platforms, reduce anxiety, and facilitate more positive evaluations of public e-services, thereby increasing both PU and PEOU (Chen and Chan, 2014).

H2a. Social support positively influences PU.

H2b. Social support positively influences PEOU.

The effect of self-efficacy on PU and PEOU

Digital self-efficacy refers to an individual's confidence in their ability to effectively use technology (Davis et al., 1989). It is a key determinant of PEOU, as individuals with greater confidence in their technological abilities tend to perceive digital systems as more intuitive and less cognitively demanding (Venkatesh and Davis, 2000). Davis et al. (1989) argue that PEOU is partially derived from self-efficacy, given that confident users require less effort to learn and operate digital technologies.

Empirical evidence supports this relationship in the context of digital public services. Wu et al. (2024) found that seniors with higher digital self-efficacy were significantly more likely to perceive e-government platforms as both useful and easy to use. Similarly, Song et al. (2022) identified self-efficacy as a mediating factor in enhancing PEOU in digital healthcare services, highlighting the effectiveness of structured training programs. Public service research further confirms that self-efficacy-enhancing interventions-such as digital literacy initiatives, interactive tutorials, and peer mentoring-can strengthen confidence and motivation among older users (Meijer, 2012; Rodríguez Müller et al., 2021).

Based on this evidence, higher digital self-efficacy is expected to positively influence PU and PEOU.
H2c. Digital self-efficacy positively influences PU.
H2d. Digital self-efficacy positively influences PEOU.

The effect of technology anxiety on PU and PEOU

Technology anxiety refers to the discomfort or apprehension individuals experience when interacting with digital systems (Meuter et al., 2003; Curran et al., 2003). Among older adults, this anxiety is often intensified by unfamiliarity, fear of making irreversible mistakes (Renaud and Ramsay, 2007; Wu et al., 2024), and concerns about privacy breaches or identity theft (Vaportzis et al., 2017).

As highlighted by Guner and Acarturk, C. (2020), increased anxiety elevates the perceived effort required to use a system, thereby reducing PEOU. Empirical studies confirm this relationship: technology anxiety discourages interest in digital tools (Wu et al., 2024), amplifies perceived complexity (Al-Hujran et al., 2015), and creates cognitive overload during digital interactions (Song et al., 2022). For example, Phang et al. (2006) found that older adults with high technology anxiety perceived online public services as more difficult to navigate, leading to lower engagement.

Importantly, beyond its detrimental effect on PEOU, technology anxiety also exerts a negative influence on PU. When individuals experience high levels of anxiety in digital contexts, they are less inclined to perceive such technologies as beneficial or capable of enhancing task performance. This effect is not limited to operational discomfort but extends to a broader skepticism regarding the actual value of digital solutions. Prior research has shown that users affected by anxiety often question the relevance and efficacy of technology in meeting their needs (Venkatesh and Bala, 2008), thereby weakening both acceptance and integration.

Given this evidence, technology anxiety is expected to negatively influence PU and PEOU.
H2e: Technology anxiety negatively influences PU.
H2f: Technology anxiety negatively influences PEOU.

PU, PEOU and attitude

The effect of PU on PEOU

Studies applying the TAM and its extensions consistently emphasize the strong relationship between PEOU and PU, both of which influence attitude toward technology adoption in e-government and digital public service contexts (Al-Hujran et al., 2015). Furthermore, PEOU is expected to have a direct impact on PU, as services perceived as easy to use are more likely to be considered useful (Venkatesh and Bala, 2008).

H3: PEOU positively influences PU.

The effect of PU and PEOU on attitude

While early versions of the TAM proposed attitude as a central mediator between PU, PEOU, and behavioral intention (Davis et al., 1989), subsequent revisions questioned its necessity. In contexts where technology use is instrumental-such as workplace settings-individuals may adopt systems for pragmatic reasons, regardless of their personal preference (Davis and Venkatesh, 1996). Accordingly, Venkatesh and Davis (2000) and Venkatesh et al. (2003) refined TAM by removing attitude, positing a direct relationship between PU and intention, particularly when performance gains are prioritized.

However, in more discretionary contexts, attitude remains a relevant predictor of intention. Yang and Yoo (2004) conceptualize attitude as comprising both affective (emotional response) and cognitive (rational evaluation) dimensions. When the cognitive component is dominant-as in the evaluation of e-government services-attitude plays a significant role in shaping behavioral intentions. Empirical evidence supports this claim: Yang and Yoo (2004) and Al-Hujran et al. (2015) found that both PU and PEOU positively influence user attitudes toward public digital services, which in turn shape their intention to use them.

H4a. PU positively influences attitude toward digital public services.
H4b. PEOU positively influences attitude toward digital public services.
H5. Attitude positively influences intention to use digital public services.

Research limitations. *This research advances a conceptual model that, while theoretically sound, has not been empirically tested, marking its main limitation. The proposed relationships-such as co-creation's impact on digital self-efficacy and technology anxiety-are anchored in prior research (Acar et al., 2023; Verschuere et al., 2018), but demand empirical scrutiny to substantiate their validity, a challenge resonant with earlier critiques of co-creation's measurable effects (Voorberg et al., 2015). The model also presumes a general ability among older adults to engage in co-creation, potentially overlooking disparities in physical, cognitive, or socioeconomic circumstances that might hinder participation (Lee and Coughlin, 2015). While it nods to regional variations, such as Italy's lagging digital service uptake (European Commission, 2023), it does not fully unpack these differences, limiting its broad applicability.*

Moreover, it sidesteps potential reluctance from service providers to embrace participatory methods, a dynamic that could obstruct practical deployment (Mergel et al., 2025). As a preliminary framework, it establishes a basis for further exploration rather than a conclusive resolution.

Managerial implications. *While this study does not provide empirical validation, the proposed conceptual model offers an initial framework for reflecting on the potential of co-creation to address psychological barriers and foster technology acceptance among older adults. If future research confirms its effectiveness, co-creation could become a critical lever for improving the accessibility and perceived relevance of digital public services for seniors-particularly in a policy landscape shaped by demographic aging and increasing digitalization.*

For policymakers and service designers, this model serves as a prompt to critically assess current assumptions about the universality of user needs and the effectiveness of participatory approaches. Although OECD frameworks emphasize co-creation as a core principle for inclusive digital service delivery (OECD, 2022), its actual value for older populations remains an open empirical question. Should future studies demonstrate limited or no impact, it would suggest the need to reconsider the role of co-creation in this context and potentially redirect efforts toward other strategies-such as tailored digital literacy programs, assistive technologies, or enhanced support infrastructures.

At the same time, if validated, this model could guide the development of more inclusive service design practices that move beyond consultation to embed older adults as active participants in the conception of digital services. In this scenario, interventions such as participatory design workshops, peer support networks, or co-learning communities could play a pivotal role in translating the promise of co-creation into measurable outcomes in terms of engagement, trust, and adoption.

In sum, the model encourages a more critical and evidence-based application of co-creation in the digital public sector. Rather than assuming its universal efficacy, it calls for an adaptive approach that aligns design strategies with the specific barriers and needs of older users.

Originality of the paper. *This study makes an original contribution by integrating value co-creation theory with technology acceptance models to examine digital public service adoption among older adults. While existing frameworks emphasize individual cognitive and usability factors, this model introduces co-creation as a contextual enabler that reduces technology anxiety, enhances digital self-efficacy, and reinforces perceived social support. By reframing seniors as co-creators of value rather than passive users, the study expands the STAM and addresses a key gap in public service literature concerning inclusive service design. The study contributes to service design theory by offering a multidimensional perspective that connects participatory approaches to key drivers of technology acceptance, thereby advancing the understanding of how co-creation can support equitable and age-responsive digital transformation.*

Keywords: *digital public services; value co-creation; older adults; technology acceptance models; digital inclusion.*

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Appendix A

Constructs	Source	Items
Value-co-creation (PB - Participation Behavior; CB - citizenship behavior)	Yi and Gong (2013)	PB1 I provided the necessary information so that the digital public service could function properly. PB2 While using the digital public service, I completed all the tasks I needed to do. PB3 While using the digital public service, I fully completed all expected activities. PB4 While using the digital public service, I fulfilled my responsibilities as a service user. PB5 While using the digital public service, I followed the guidelines and requirements. PB6 While using digital public services, I can be patient with the system. CB1 I informed the staff when I had useful ideas on how to improve digital public services. CB2 I evaluated their services when digital public services provided me with good service. CB3 I informed the staff when I encountered problems in using digital public services. CB4 I shared with others about the pleasant experience of using digital public services. CB5 I helped other users when they encountered problems in using digital public services. CB6 I gave suggestions to other users when they used digital public services.
Digital self efficacy	Kumar et al. (2023)	DSE1 I think that I do not have enough capability to use digital public services. DSE2 I do not have the confidence to use digital public services. DSE3 I do not feel comfortable using digital public services.
Technological anxiety	Jon Chao et al. (2012)	TA1 When using new digital public services, I worry that I might break them. TA2 When using new digital public services, I worry that pressing the wrong buttons might cause the system to freeze or accidentally delete important data. TA3 Operating new digital public services makes me anxious or uncomfortable.
Perceived social support	Zimet et al. (1988)	PSS1 There is a special person who is around when I am in need. PSS2 There is a special person with whom I can share my joys and sorrows. PSS3 My family really tries to help me. PSS4 I get the emotional help and support I need from my family. PSS5 I have a special person who is a real source of comfort to me. PSS6 My friends really try to help me. PSS7 I can count on my friends when things go wrong. PSS8 I can talk about my problems with my family. PSS9 I have friends with whom I can share my joys and sorrows. PSS10 There is a special person in my life who cares about my feelings. PSS11 My family is willing to help me make decisions. PSS12 I can talk about my problems with my friends.
PU	Davis (1989a)	PU1 Using digital public services would enhance my productivity. PU2 Using digital public services will make me more effective. PU3 Digital public services will facilitate my daily tasks. PU4 The use of digital public services is valuable for citizens.
PEOU	Davis (1989a)	PEOU1 Using digital public services requires little mental effort. PEOU2 I can easily set up and personalize digital public services. PEOU3 My interaction with digital public services is clear and understandable. PEOU4 Digital public services are easy to use.
ATT	Venkatesh (2003)	ATT1 Using digital public services is a good idea. ATT2 Digital public services make my tasks more efficient. ATT3 Digital public services are user-friendly. ATT4 I like using digital public services.
Behavioral intention of use	Wong (2015)	BI1 I intend to use digital public services in the future. BI2 I predict I will use digital public services regularly. BI3 I plan to use digital public services for my needs.

How Artificial Intelligence in Advertising Impacts Consumer Perceptions of Brand Authenticity

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Abstract

Artificial Intelligence (AI) is transforming the advertising industry, raising important questions about its impact on brand authenticity. This study examines how AI-driven advertising affects consumer perceptions of authenticity, using focus groups to explore consumer attitudes. The findings reveal that transparency in AI use plays a crucial role in maintaining brand authenticity-brands that openly disclose AI involvement reinforce credibility and strengthen consumer trust. When used ethically and responsibly, AI has the potential to enhance rather than undermine authenticity. However, this effect is shaped by factors such as clear communication, consumer awareness, and alignment with brand values..By bridging AI-driven advertising with existing literature on brand authenticity, this research advances the discussion on responsible AI integration in marketing. It highlights the need for clear regulations to prevent deceptive practices and positions AI as a tool for ethical innovation rather than a threat to authenticity.

Framing of the research. *Artificial Intelligence has become an integral part of business strategies across industries, with advertising being one of the most profoundly impacted sectors. The integration of AI into advertising is accelerating at an unprecedented pace, driven by the ability of machine learning algorithms to process vast amounts of consumer data, predict behavioral patterns, and generate hyper-personalized marketing content (Kietzmann, Paschen, and Treen 2018). AI's growing role in advertising enables real-time optimization of campaigns, automated content creation, and enhanced targeting precision, significantly increasing efficiency and cost-effectiveness for brands (Malthouse et al. 2019).*

As AI-generated content becomes more sophisticated, the boundaries between human-created and machine-generated communication are becoming increasingly blurred (Kaplan and Haenlein 2019). The rise of AI-driven copywriting, visual content production, and synthetic influencers challenges traditional notions of creativity, authorship, and authenticity in advertising. Consumers are now frequently exposed to advertisements, social media posts, and brand interactions that may have been entirely designed by AI, often without their knowledge. This has led to growing concerns regarding transparency, consumer trust, and the perceived authenticity of AI-generated brand messaging (Davenport et al. 2020).

The ability of AI to simulate human creativity and emotional resonance raises critical questions about its impact on consumer perception. Authenticity has long been recognized as a key driver of consumer trust, brand loyalty, and emotional engagement (Morhart et al. 2015; Napoli et al. 2014). Consumers tend to favor brands that are perceived as genuine, transparent, and aligned with their values (Beverland 2009). However, the increasing reliance on AI in advertising presents a paradox: while AI allows brands to deliver hyper-personalized content at scale, it also removes the human element that traditionally underpins authenticity (Fritz, Schoenmueller, and Bruhn 2017). This has led to skepticism among consumers, who question whether machine-generated brand narratives can evoke the same emotional depth and credibility as human-created content (Wu and Wen 2021).

The implications of this shift are both theoretical and managerial. From a consumer behavior perspective, research suggests that trust in advertising is contingent on perceived transparency, credibility, and emotional relatability (Chaudhuri and Holbrook 2001). If AI-generated advertising is perceived as overly artificial, inauthentic, or manipulative, consumers may disengage, leading to decreased brand trust and loyalty (Campbell et al. 2022). Conversely, when AI is used transparently and ethically, it has the potential to enhance brand engagement by providing consumers with highly relevant and personalized experiences (Wu and Wen 2021).

From a managerial standpoint, the challenge for brands is twofold: how to leverage AI to enhance advertising efficiency without eroding authenticity and consumer trust, and how to integrate AI-driven strategies while maintaining transparency in brand communication (Davenport et al. 2020). Failing to address these challenges could lead to consumer skepticism, reputational risks, and diminished long-term brand equity (Beverland 2009). Research on AI ethics in advertising suggests that consumers react negatively when they feel misled or manipulated by AI-driven content, particularly when AI use is concealed or its impact is exaggerated (Fritz, Schoenmueller, and Bruhn 2017). This

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highlights the necessity for brands to establish clear AI disclosure strategies, ensuring that consumers understand the extent of AI's involvement in advertising content creation (Kaplan and Haenlein 2019).

This research aims to address this critical gap by investigating how AI-generated advertising influences consumer perceptions of authenticity. Despite AI's rapid adoption in marketing, academic research remains limited in examining its impact on brand authenticity. Most existing studies have focused on AI's role in programmatic advertising, targeting, and campaign automation (Qin and Jiang 2019), as well as consumer reactions to AI-generated content in isolated contexts (Wu and Wen 2021). However, a crucial gap in the literature persists regarding the long-term implications of AI on brand authenticity and consumer trust (Fritz, Schoenmueller, and Bruhn 2017). While it is well-documented that authenticity plays a vital role in brand-consumer relationships, little is known about whether AI-generated advertising can sustain authenticity or if it inherently dilutes it (Morhart et al. 2015). Using a qualitative approach, the study examines whether AI enhances or hinders authenticity and explores the role of transparency and ethical AI use in mitigating potential consumer skepticism. The findings contribute to both academic research and managerial practice by offering new insights into the intersection of AI, brand authenticity, and consumer trust. The study provides theoretical contributions by bridging AI research with brand authenticity literature and offers practical guidance for marketers navigating the complexities of AI-driven brand communication.

The article is structured as follows: first, it reviews the literature on AI in advertising and brand authenticity; next, it outlines the research methodology and presents key findings; finally, it discusses managerial implications, limitations and proposes future research directions.

Purpose of the paper. *While prior research has extensively examined AI's technical capabilities in advertising-such as automation, targeting precision, and engagement optimization (Kietzmann, Paschen, and Treen 2018; Malthouse et al. 2019)-its impact on perceived authenticity remains largely unexplored. Authenticity is a crucial factor in shaping consumer responses to advertising, influencing brand perception and long-term engagement. However, as AI-generated advertisements become more prevalent, concerns arise about whether they can maintain the sense of originality, emotional depth, and consistency traditionally associated with authentic brand communication.*

Existing research on advertising effectiveness has emphasized the importance of informativeness, credibility, and emotional engagement in shaping perceived authenticity (Richards and Curran 2002; Pollay and Mittal 1993; Lutz, MacKenzie, and Belch 1986). Yet, these findings have not been fully applied to AI-created content. While early studies suggest that AI-driven advertising is valued for its efficiency (Wu and Wen 2021), others highlight its potential to feel impersonal or inauthentic (Sundar 2008). This tension raises critical questions: Can AI-generated advertising replicate the authenticity consumers expect from brands? If so, under what conditions does AI enhance or undermine authenticity?

Brand authenticity has traditionally been linked to human creativity, emotional storytelling, and alignment with core brand values (Fritz, Schoenmueller, and Bruhn 2017; Rose and Wood 2005). However, as AI increasingly mediates brand communication, it remains unclear whether it can uphold these qualities. While studies on brand engagement and consumer perceptions suggest that authenticity plays a vital role in fostering strong brand relationships (Beverland 2009; Morhart et al. 2015), the implications of AI-driven advertising for authenticity perceptions have yet to be fully understood.

To address this gap, this study examines how AI-generated advertising influences consumer perceptions of brand authenticity. Specifically, it investigates whether AI can enhance or compromise authenticity and identifies the conditions under which brands can integrate AI without eroding consumer confidence in their authenticity. By focusing on this emerging challenge, the study contributes to the growing discourse on AI in advertising, offering new insights into the evolving relationship between AI, branding, and authenticity.

RQ: How does AI-generated advertising shape consumer perceptions of brand authenticity, and under what conditions is AI perceived as enhancing or diminishing authenticity?

Methodology. *This study adopted a qualitative approach to explore consumer perceptions of AI in advertising, particularly given the limited existing research on this topic. Focus Groups were chosen as the most suitable method for capturing in-depth consumer insights. This method enables interaction between participants, leading to the spontaneous emergence of themes that may not surface in individual interviews (Bell, Bryman, and Harley 2022).*

Four Focus Groups, each consisting of six participants, were conducted, with participants selected based on two key criteria: age (18 to 60 years) and background in Marketing or Management. This selection was guided by two assumptions: younger individuals are generally quicker in adopting technology, while those with a Marketing or Management background possess greater expertise in advertising. The Focus Groups were structured to ensure a balanced representation of perspectives, distinguishing between participants with and without marketing expertise.

The discussions followed a semi-structured format, covering key themes such as Advertising, AI in Advertising, Transparency in Brand Communication, and Brand Authenticity. Participants were encouraged to engage with open-ended, probing, and funnel questions, designed to elicit deeper responses and guide the conversation naturally. Leading questions were minimized to avoid bias, while follow-up probing techniques were used to encourage participants to elaborate on their thoughts. Before the Focus Groups, participants were contacted via message and telephone to confirm eligibility based on the selection criteria. Once confirmed, they received an official invitation via email with a Microsoft Teams link for the session. Prior to participation, they were sent an informed consent form detailing the study's purpose, voluntary participation, confidentiality measures, and the right to withdraw at any time (Bell, Bryman, and Harley 2022).

Participants were also informed that the discussions would be recorded (both audio and video) to ensure accurate transcription and analysis. The moderator ensured that all participants felt comfortable and understood the study's objectives before the discussion began.

Each Focus Group followed a structured yet flexible discussion guide to ensure consistency while allowing for organic interactions. The session began with an introduction to the research topic, after which participants introduced themselves and shared their general opinions on AI and advertising. The discussion unfolded in different phases, beginning with an exploration of general perceptions of AI, where participants were asked about their understanding of AI, its role in society, and their attitudes toward AI-generated content. The conversation then shifted to AI's role in advertising, including its advantages, concerns, and ethical implications. Participants then watched a commercial advertising without being informed that it was AI-generated and shared their impressions, discussing elements such as emotional engagement, credibility, and perceived effectiveness. Once the AI involvement was revealed, participants re-evaluated their initial impressions, reflecting on how this information influenced their perception of the ad, brand authenticity, and trust. The final part of the discussion focused on transparency in brand communication, AI's impact on authenticity, and the extent to which AI can coexist with genuine brand messaging. Throughout the discussion, the moderator employed probing techniques to explore underlying attitudes and beliefs, ensuring that participants elaborated on their responses. Funnel questions were used to guide participants from broad generalizations to more specific reflections on AI's impact on branding. Open-ended questions encouraged unrestricted responses, allowing participants to voice concerns, personal experiences, and expectations.

At the end of each Focus Group, participants were thanked for their contributions and informed about the next steps in the research. They were given the opportunity to provide additional comments or clarifications. As a small incentive, participants were offered a follow-up summary of the research findings upon request. To ensure anonymity, all personal data were anonymized, and participants were reminded that their recorded responses would be used solely for research purposes. Data storage and confidentiality procedures followed ethical guidelines (Bell, Bryman, and Harley 2022).

The recorded discussions were transcribed and analyzed using NVIVO, a leading qualitative data analysis software. NVIVO enables the organization, categorization, and visualization of data to identify emerging patterns (NVivo 2024). Coding was performed through a three-stage process (Strauss and Corbin 1990). In open coding, key themes from participants' responses were initially identified. Axial coding was used to establish relationships between these themes, examining how perceptions of AI advertising influence brand trust and authenticity. Selective coding synthesized the findings into overarching themes that contribute to understanding consumer attitudes toward AI-driven advertising. The analysis followed an iterative process, ensuring that interpretations remained closely tied to participants' verbatim responses (Cooney 2010).

The study adhered to strict ethical guidelines to protect participants' rights and data. Informed consent was obtained prior to participation, ensuring voluntary involvement and the right to withdraw at any time (Bell, Bryman, and Harley 2022). Participants were assured of confidentiality, with personal information anonymized and deleted after six months. The study complied with data protection regulations and ethical research standards, with findings intended solely for academic and scientific dissemination.

Results. *The study involved four Focus Groups, each groups were structured as follows: Group A included younger individuals (18-35 years) with no Marketing or Management background, Group B consisted of younger individuals (18-35 years) with experience in these fields, Group C included older participants (35-60 years) without a specialized background in Marketing or Management, and Group D comprised older participants (35-60 years) with such expertise. This classification provided a diverse range of perspectives, allowing for a nuanced exploration of how AI in advertising is perceived across different demographic and professional segments.*

Table 1: Sample Characteristics

Participant	Gender	Age	Background	Occupation
A1	Female	20	No Marketing/ Management	Student
A2	Female	27	No Marketing/ Management	Employee
A3	Male	20	No Marketing/ Management	Student
A4	Female	20	No Marketing/ Management	Student
A5	Male	21	No Marketing/ Management	Student
A6	Female	20	No Marketing/ Management	Student
B1	Female	23	Marketing/ Mangement	Student/Employee
B2	Male	23	Marketing/ Mangement	Student/Employee
B3	Male	22	Marketing/ Mangement	Student/Employee
B4	Male	24	Marketing/ Mangement	Student/Employee
B5	Female	23	Marketing/ Mangement	Student
B6	Female	22	Marketing/ Mangement	Student
C1	Female	60	No Marketing/ Management	Employee
C2	Male	60	No Marketing/ Management	Employee
C3	Female	44	No Marketing/ Management	Employee
C4	Male	53	No Marketing/ Management	Employee
C5	Female	40	No Marketing/ Management	Employee
C6	Female	56	No Marketing/ Management	Employee
D1	Male	52	Marketing/ Mangement	Employee
D2	Female	53	Marketing/ Mangement	Employee
D3	Male	58	Marketing/ Mangement	Employee
D4	Female	54	Marketing/ Mangement	Employee
D5	Male	53	Marketing/ Mangement	Employee
D6	Male	52	Marketing/ Mangement	Employee

The findings revealed a mix of pre-existing attitudes from the literature and new insights emerging from Focus Groups. In particular, the Third-Order codes (central categories, more abstract concepts), Second-Order codes (codes created according to similarities and differences or other forms of relationships between the first-order codes) and First-Order codes (topics expressed directly from Focus Groups) were aligned with the focus group script and represented the forming topic of the research. The findings represent a mix of already identified structures in the literature and new aspects resulting from the focus groups. Table 2 shows all constructs used for the analysis divided by their respective levels. The Third-Order constructs can be classified as follows: Advertising and Consumer Attitudes towards Advertising, AI, AI in Advertising, Attitude toward AI Advertising, Transparency in Brand Communication, ADV Authenticity and AI, Brand Authenticity and AI and Outcomes of Brand Authenticity. Second-Order constructs, meanwhile, are divided into: Emotions, Relevant Elements in Advertising, Consumers Attitude towards the Brand, Online Advertising and TV Advertising. These Second-Order constructs are associated with the Third-Order construct "Advertising and Consumer Attitudes towards Advertising". The Second-Order constructs AI Opportunities and AI Ethical Challenges are associated with the Third-Order construct "AI". The Second-Order constructs of Main Consumers Perceptions associated to AI ADV and Ethical Considerations of Use of AI in ADV are related with the Third-Order construct "AI in Advertising". Moreover, Impact of the use AI in ADV on Brand and Product and Challenges related to the use of AI in ADV are associated with the Third-Order construct "Attitude toward AI Advertising". The Second-Order constructs of Communications about the use of AI In ADV and Impact on the Brand are related with the Third-Order construct "Transparency in Brand Communication". ADV Authenticity Elements, and Impact of AI on ADV Authenticity are associated with the Third-Order construct "ADV Authenticity and AI". The Second-Order constructs of Brand Authenticity Characteristics, and Impact of AI on Brand Authenticity are related with the Third-Order construct "Brand Authenticity and AI". Finally, Behavioral and Attitudinal are related with the Third-Order construct "Outcomes of Brand Authenticity". For completeness, the table also shows the First-Order codes that were used in the analysis.

Table 2: Codes

Source: author elaboration based on NVivo output

Analyzing the Third-Order codes in detail, including the number of references (times the topic was raised) and sources (number of Focus Groups), all participants engaged with each main interview topic, and no one refused to answer any questions (Table 2). The most discussed construct, with 235 references, is "Advertising and Consumer Attitudes Towards

Advertising," the main topic of the study on which all other topics are based. Conversely, "Outcomes of Brand Authenticity" has the fewest references at 19, likely because it wasn't directly questioned but inferred from discussions on other topics.

Table 3: References and Sources of the Third-Order codes

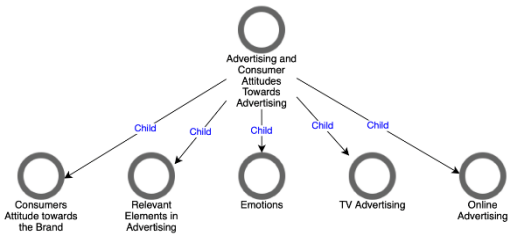
Third - Order Construct	References	Sources
Advertising and Consumer Attitudes Towards Advertising	235	4
AI	93	4
AI in Advertising	119	4
Attitude toward AI Advertising	117	4
Trasparency in Brand Communication	78	4
ADV Authenticity and AI	83	4
Brand Authenticity and AI	59	4
Outcomes of Brand Authenticity	19	4

Source: author elaboration based on NVivo output

The Focus Group analysis highlights the interplay between AI in advertising and brand authenticity, emphasizing key factors such as visual appeal, emotional connection, transparency, and trust.

Visual aesthetics and clear messaging were the most valued aspects of advertising, with 21 out of 24 participants emphasizing the importance of a well-crafted ad. As A3 noted: "What strikes me the most is whether the advertisement is well done, both visually/cinematically and in terms of effect."

Figure 1: Third- Order Constructs "Advertising and Consumer attitudes towards Advertising" and associated Second-Order Constructs.

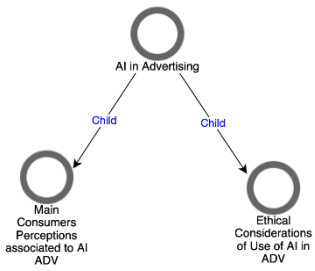


Source: author elaboration based on NVivo output

Brand perception also played a crucial role, with 22 participants confirming its influence on purchase intention. Emotional engagement was another defining factor, as B3 stated: "The elements I value most are the emotions that an ad has to convey." Online advertising was preferred for its accessibility and personalization, with A2 remarking: "Online, the customer can see a product, explore the site to find similar or more suitable products, and order them directly at home."

Regarding AI in advertising, process efficiency was cited as the greatest advantage, improving productivity and reducing costs. However, AI-generated ads were often perceived as easily recognizable and lacking realism, as A3 observed: "I didn't like it because you could tell it was fake."

Figure 2: Third-Order Constructs "AI in Advertising" and associated Second-Order Constructs.

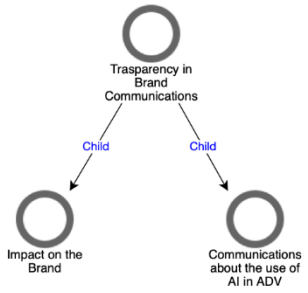


Source: author elaboration based on NVivo output

While awareness of AI use did not significantly alter perceptions, transparency remained a critical factor. Seventeen participants supported clear AI disclosure in ads, with B6 emphasizing: "It would convey a message of transparency."

In contrast, a few respondents saw disclosure as unnecessary, believing AI is already an industry standard, as A3 stated: "There is no need to communicate artificial intelligence in an advertisement because most ads today already use AI."

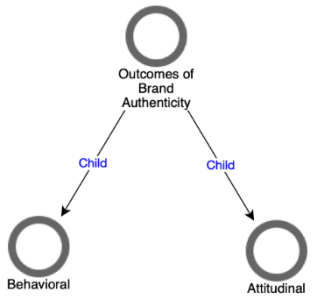
Figure 3: Third-Order Constructs "Transparency in Brand Communication" and associated Second-Order Constructs.



Source: author elaboration based on NVivo output

Trust and authenticity emerged as additional central themes. Fifteen participants linked brand authenticity to trust and loyalty, as D3 noted: "If I perceive a brand as authentic, it increases my trust and loyalty." AI and authenticity were largely seen as compatible if AI is used ethically and transparently, as D2 explained: "A brand using AI can still be authentic if it does so responsibly."

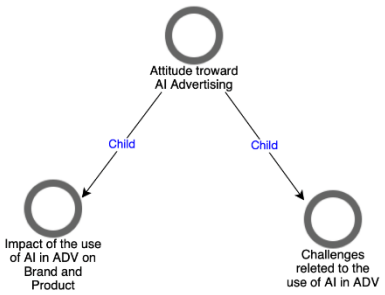
Figure 4: Third-Order Constructs "Outcomes of Brand Authenticity and AI" and associated Second-Order Constructs.



Source: author elaboration based on NVivo output

However, concerns over emotional detachment remained, with C5 stating: "While efficiency and personalization increase, there is a feeling of detachment that fails to establish an emotional connection".

Figure 1: Third-Order Constructs "Attitude toward AI in Advertising" and associated Second-Order Constructs.



Source: author elaboration based on NVivo output

Differences in perception emerged across demographics. Younger marketing professionals embraced AI for innovation, while older participants were more cautious, emphasizing trust and consistency. Marketing professionals viewed AI as a tool to enhance authenticity rather than replace human creativity, provided it maintains ethical and transparent practices.

This study reveals that AI-generated advertising has a complex relationship with brand authenticity, capable of both enhancing and diminishing it depending on its implementation and communication. Transparency is a key determinant of consumer perception, with many participants emphasizing the importance of clear AI disclosure in fostering honesty

and credibility. However, a minority view AI as an industry norm, questioning the necessity of explicit disclosure. Ethical AI use is another crucial factor-when brands integrate AI responsibly, ensuring that it aligns with core values and avoids deceptive practices, consumers perceive AI as a tool that can support rather than compromise authenticity.

At the same time, AI-generated content often lacks the emotional depth and human creativity traditionally associated with authentic advertising. Many participants noted that AI-driven ads, while visually polished, sometimes feel impersonal or overly synthetic, making it difficult to establish a meaningful emotional connection with consumers. This sense of detachment can weaken perceptions of authenticity, particularly among older consumers who value consistency and trust in brand communication. Younger marketing professionals, however, were more open to AI's role in innovation, seeing it as an opportunity to enhance rather than replace authenticity.

Ultimately, AI itself does not inherently diminish brand authenticity-its impact depends on how brands balance technological advancement with human-centric storytelling and ethical communication. Brands that use AI transparently, maintain a strong emotional connection, and align AI-generated content with their established identity can leverage AI as a tool for innovation without compromising authenticity.

Research limitations. *Convenience and snowball sampling may have introduced bias, while online Focus Groups limited control over participants' environments and emotional cues. Language was another constraint, as interviews in Italian required English translation, possibly altering responses. Additionally, viewing an AI-generated commercial may have influenced participants' perceptions. Future research could explore AI transparency in advertising, best practices for balancing innovation and authenticity, and quantitative studies to generalize findings. Comparing consumer perceptions of AI-driven vs. traditional ads and refining sample criteria to include AI and advertising experts could provide deeper insights. Further studies may also examine global AI adoption and regulatory impacts on consumer trust.*

Managerial implications. *The study underscores the balance between technological innovation and core values like authenticity and trust. Managers must ensure AI-generated content accurately reflects reality to avoid distorting consumer perceptions. Clear AI usage guidelines, including manuals, training, and oversight by internal experts, can aid its effective integration.*

Transparent communication of AI's benefits and limitations is crucial, as its long-term impact remains uncertain. Implementing monitoring systems, such as surveys, social media analysis, and KPIs tracking (e.g., conversion rates, user satisfaction), can help assess AI's effect on brand perception and refine strategies.

Emotional engagement, via storytelling or tone of voice, can ease AI acceptance. Companies could train AI to create emotionally compelling ads and test pilot campaigns to gauge consumer reactions.

Finally, transparency is key-publishing reports on AI usage and outcomes fosters trust and keeps customers informed.

Originality of the paper. *This study provides a novel contribution to the existing literature by exploring the intersection of AI in advertising and brand authenticity, a topic that remains underexplored despite the growing presence of AI in marketing. While previous research has primarily examined AI's efficiency and personalization capabilities, this study addresses a critical gap by analyzing how AI-generated advertising shapes consumer perceptions of authenticity. Rather than focusing solely on trust or brand perception, this research highlights the conditions under which AI is perceived as enhancing or diminishing authenticity.*

Through qualitative analysis via focus groups, the study uncovers both established themes from the literature and emerging consumer concerns. It reveals that AI's role in advertising creates a paradox: while AI can enhance authenticity by improving consistency and efficiency, it also risks diminishing it when ads lack emotional depth or appear overly synthetic. A key finding is that transparency in AI communication plays a decisive role-clear disclosure fosters authenticity by reinforcing brand honesty, whereas ambiguous AI use may lead to skepticism.

Furthermore, this research deepens the conversation on responsible AI integration by emphasizing the ethical and strategic considerations necessary to maintain authenticity. It bridges the gap between AI-driven advertising innovation and the fundamental consumer expectation of brand genuineness, offering insights that are valuable for both academic discourse and industry practices. By highlighting the balance between technological advancement and human-centric storytelling, this study provides actionable recommendations for brands seeking to leverage AI while preserving their authentic identity.

Key words: *Artificial Intelligence, Brand Authenticity, Advertising, Brand Communication, Consumer Perception.*

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The SITE Model: A Conceptual Framework for Understanding AI and Emerging Technologies in Tourism and Hospitality

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Abstract

This study analyzes the role of Artificial Intelligence (AI) and emerging technologies in tourism and hospitality through a literature review. To provide a structured understanding of their adoption, we introduce the SITE Model, a framework that synthesizes the literature into four key areas: Sustainability, Impact, Technology, and Experience. Using the PRISMA approach, a literature review was conducted on 52 articles from 2018 to 2024. Our findings indicate that AI and emerging technologies enhance sustainable mobility, operational efficiency, and customer experience, while also raising ethical and social challenges. Their strategic integration is essential for maximizing engagement and innovation in the sector. By offering a comprehensive perspective, this study contributes to guiding future research and strategy development.

Research framework and purpose. *Research on artificial intelligence (AI) and emerging technologies in hospitality and tourism industry has increasingly grown over recent years due to the pervasiveness of AI-enabled technologies, which are relevant for both scholars and managers. Artificial intelligence (AI) could be defined as a subfield of computer science that explains how machines can mimic human intelligence (Tussyadiah, 2020). Similarly, AI may also refer to "the use of computational machinery to emulate capabilities inherent in humans, such as doing physical or mechanical tasks, thinking, and feeling" (Huang & Rust, 2021, p.31). AI is also considered as a set of technologies capable of imitating human intelligence in learning, problem-solving and decision-making processes. It includes systems that analyze large volumes of data (big data), leverage advanced algorithms, and improve their performance over time through learning processes such as machine learning and deep learning. It is pointed out that AI technology includes both effective technologies and emerging technologies (Doborjeh et al., 2022). Effective technologies concern machine learning, artificial neural networks, and deep learning for analyzing complex data; emerging technologies concern virtual/augmented reality, robotics, and chatbots that are also transforming the tourism industry by offering personalized experiences and improving operational efficiency (Bulchand-Gidumal, 2020).*

Literature has analyzed AI and emerging technologies in tourism and hospitality in a quite fragmented way as separated research fields that consider different perspectives. Moreover, the literature fragmentation calls for a more focused research effort to better understand a comprehensive view that organizes the topics in an organic way. This study aims at providing a more comprehensive understanding of the artificial intelligence phenomenon in hospitality and tourism industry by collecting evidence from the associated literature. We propose the SITE model, a theoretical framework which provides a clear structure for classifying academic research on the role of Artificial Intelligence (AI) and emerging technologies in tourism and in the hospitality into four thematic areas: 1. Sustainability; 2. Impacts; 3. Technology, 4. Experience.

The first thematic area includes studies on the environmental and social impacts of AI and emerging technologies in terms of reducing the environmental impact of tourism and improving the sustainability of destinations. The articles within this category highlight how the adoption of AI, intelligent automation technology and smart technologies can contribute to greener tourism. The second area focuses on how the implementation of artificial intelligence in the hospitality and tourism sector is taking place and what its impacts could be at the organizational and economic level. The third area includes studies on the use of innovative technologies in tourism, such as augmented reality, robotics and machine learning, and analyzes how they are revolutionizing tourism. Lastly, the fourth category includes studies

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investigating how AI and intelligent automation may improve customer experience (for instance, the use of chatbots and intelligent systems to customize tourism offers).

In general, the paper offers a descriptive framework that allows for an organized classification of the literature, serving as a solid starting point for future theoretical developments that could, for example, analyze the causal relationships between the topics included in the proposed model.

Methodology. *A literature review was conducted. In order to provide a reliable and bias-free analysis of the empirical evidence, we based our methodology on the PRISMA approach across four stages (Moher et al., 2015; identification, screening, eligibility and inclusion).*

Identification. We identified academic articles published in international peer-reviewed scientific journals. The search engine used for this purpose was Scopus and Scholar widely recognized as a major source of academic research (Paschou et al., 2020). We selected two sets of keywords to explore the role of Artificial Intelligence and emerging technologies in tourism and hospitality. The first set of keywords included: 'Artificial Intelligence', 'Machine Learning', 'Smart Tourism Technologies', 'Chatbot', 'Robotics', 'Augmented Reality', 'Virtual Reality', 'Internet of Things' and 'Intelligent Automation'. The second set of keywords included terms such as 'Tourism Innovation', 'Smart Destinations', 'Digitization in Tourism' and 'Hospitality Management'. After defining the final set of keywords, we launched a series of search queries based on data mining criteria to extract the most relevant articles to describe the state of the art. A query was for example: "Title-Abs (("AI" and "Chatbot") and ("Tourism Innovation" or "Hospitality Management")) and pubyear > "2018" and <"2024" and (limit-to (doctype, "ar") or limit-to (doctype, "cp")) and (limit-to (language, "English"))).

Screening. We considered only papers published in the most relevant journals (e.g., Journal of Hospitality and Tourism Insights). We focused exclusively on articles written in English in the field of marketing and management applied to the tourism sector. From an initial list of 54 manuscripts, two were excluded and a final sample of 52 articles published between 2018 and 2024 was considered.

Eligibility and Inclusion. Abstracts were screened to include only results consistent with AI and emerging technologies in tourism and hospitality. Through this process, 31 articles were removed because they did not meet the eligibility and inclusion criteria (e.g., because they were not in line with the specific topic of the review). Therefore, for the literature analysis, 21 final articles were considered. For each article, we created summary sheets reporting purpose, methodology and main findings, as well as identifying the key constructs defined by the authors. This process allowed us to structure and categorize the literature facilitating comparative analysis.

Results. *Based on the final sample of 21 papers we divided them into four thematic macro areas.*

1) Sustainability - In this first category we analyzed the environmental and social impacts of AI and emerging technologies on the environment of the destinations. Kim et al. (2023) studied how artificial intelligence contributed to sustainable tourism mobility. According to their research, they stated that AI optimized the efficiency of public transport, for example by facilitating travel planning. More exactly, AI is integrated into the EVAB model as a moderator, showing how it can strengthen the links between personal values, positive attitudes towards sustainability, personal and social norms, and subjective well-being of tourists. This makes it more likely that tourists will adopt green behavior. Also, according to Kim et al. (2024a), AI and smart apps influence public transport usage and reduce CO2 emissions. The authors' proposed research framework explains how AI benefits and awareness, as well as the usefulness and knowledge of smart apps, influence the intention for participation in public transport, considering older and younger population segments and gender. While Kim et al. (2024b) considered that artificial intelligence contributed to the sustainability of space tourism, Majid et al. (2023) studied intelligent automation for sustainable tourism development to facilitate an understanding of how the power of technology can be harnessed in achieving a sustainable tourism agenda. Lastly, Balsalobre-Lorente et al. (2023) highlighted the Information and Communication Technology role in reducing the environmental impact of urbanization, tourism, and natural resources exploitation. Artificial intelligence is not explicitly analyzed as a standalone construct, the article integrates the concept within ICT, implying its role in enhancing technological efficiency and supporting smart decision-making processes in urbanization, tourism, and natural resource management to achieve environmental sustainability.

2) Impacts - The articles within this category focused on how the implementation of artificial intelligence in the hospitality and tourism sector is taking place and what its impacts could be at the organizational and economic level. Sharma et al. (2022) examined the impact of artificial intelligence (AI) on the competitiveness of tourism firms. The study has identified 10 key factors impacting AI-driven competitiveness in tourism. The competitiveness of tourism firms is assessed primarily through their financial performance. Tourist satisfaction directly influences financial performance. AI-skilled workforce and infrastructure are foundational for AI adoption. AI-enabled technologies and digital platforms enhance productivity and innovation. Government policies and regulations shape AI implementation. The hierarchical model adopted in the study shows interdependencies between these factors. Therefore, strategic AI adoption boosts competitiveness in the tourism sector according to this research. Similarly, another study identifies human knowledge, including employee education and training, as the most significant factor influencing the adoption of automation and AI in the hospitality and tourism sectors (Jabeen et al., 2022). AI adoption in hospitality and tourism varies by application type according to another study (Huang et al., 2021). It is highlighted that highly adoptable technologies are search/booking engines and virtual agents/chatbots due to personalized and efficient user experiences. Appreciated technologies are AR/VR applications because of their immersive capabilities. Less adoptable technologies are robots, autonomous vehicles, and kiosks/self-service screens due to perceived risks, operational complexity, and low trialability.

Another author presented a research agenda on intelligent automation in tourism (Tussyadiah, 2020). Four research priorities were indicated, namely: designing beneficial artificial intelligence, facilitating adoption, assessing the impacts of intelligent automation on tourism, and creating a sustainable future with intelligent systems. Assessing the impacts of intelligent automation on tourism, Tussyadiah (2020) identified negative and positive impacts of AI. The economic, psychological and social impacts of artificial intelligence are negative.

Economic impacts relates to changes in productivity of intelligent automation: for instance, when tourist and hospitality service jobs are replaced by intelligent machines. Psychological impacts of AI and human-robot interaction, as well as emotional responses to the closeness of robot appearance to that of humans, technostress, loneliness, and isolation are all due to reduced interpersonal interaction and increased solitary activities. By assessing social impacts of intelligent automation, the author highlights the reduction of the need for personal, face-to-face interactions between tourists and residents.

As for the positive impacts of AI, the complementarity between humans and intelligent systems in collaborative decision making and task assignment is considered the first significant impact. As people increasingly use and rely on virtual assistants and robots to manage their daily and travel needs, it is necessary to fundamentally change perception of the role of intelligent agents in society, from simple tools to large and complex social actors. This is the second positive impact of AI.

Mariani and Wirtz (2023) highlighted in their study that the adoption of AI has influenced data analysis in the hospitality and tourism sector. The study is a critical reflection on the extent to which hospitality and tourism management scholars have accurately used the term "analytics". "Analytics is the scientific process of transforming data into insight for making better decisions" (Boyd, 2012, p. 1). Findings show that there is an exponential growth of articles published in hospitality and tourism academic journals on the topic of "analytics" from 2011 to 2022. A systematic literature review was conducted by Mariani and Wirtz to understand to what extent analytics has been accurately and consistently defined in the hospitality and tourism management literature. It is found that articles rarely defined their interpretation of analytics and the specific type of analytics used.

The last article within this category focuses on how the implementation of artificial intelligence in the hospitality and tourism sector is taking place according to a systematic literature review (Kong et al., 2023). The study emphasized that AI research relating to the hospitality and tourism industry has shown a growing trend since 1991, and that the number of publications and citations has increased significantly since 2018, thus indicating that AI has become a focus for researchers. It suggests that the topic of AI has obtained considerable research attention, which corresponds to the widespread application of service robot (SR) during the outbreak of COVID-19 worldwide.

3) Technology - The third category includes studies on the use of innovative technologies in tourism, such as augmented reality, robotics and machine learning and analyses how they are revolutionizing the tourism sector. Pratisto et al. (2022) provided a comprehensive view of immersive technology in tourism by critically analyzing prior scholarly work. The article explores the use of immersive technology in the tourism sector. Immersive technology concepts can be considered on a reality-virtuality continuum: at the former end is reality environment, and at the latter end is a computer-generated virtual environment. Within that spectrum there are two concepts - augmented reality (AR) and augmented virtuality (AV), which fall under the umbrella terminology of mixed reality (MR). In addition, there is virtual reality (VR), which is a fully virtual environment (Milgram et al., 1995). Therefore, immersive technology includes AR and VR. Whereas AR can overlay the view of the user's current environment with digital objects, VR can create a virtual environment that the user can seamlessly interact with in real time. Thus, AR combines a virtual object with the real environment in real time. AR provides additional interpretation resources to enhance user engagement with the observed object during visitation, significantly impacting the experience. AR device information also needs to be delivered in real time to pique the user's interest and allow an uninterrupted leisure experience (Han et al., 2019). VR as a marketing tool in tourism research was more common than AR, specifically pre-visit tourism destination promotion.

Both AR and VR can increase the quality of visitors' experience of a destination. From this perspective, immersive technology enables tourism stakeholders to enhance tourists' satisfaction since consumers can choose and modify such an experience to a degree that was once considered impossible (Williams & Hobson 1995). Findings show the increasing number of articles published from 2012 to 2020 on the use of immersive technology in the tourism sector. This review provides a comprehensive view of the use of immersive technology in tourism research and the potential challenges it poses. The article examines how AR applications and VR applications usage, - such as AR applications for tour guidance (via smart glasses or mobile device), navigation, education, marketing, heritage preservation, entertainment, accessibility and VR applications for marketing, heritage preservation-, are revolutionising the tourism sector. Therefore AR/VR applications usage to improve the user's experience while exploring location or object. Sustacha et al. (2023) studied smart destinations linked to smart cities, thus considering the urban approach based on the employment of ICTs in economy, environment, mobility, and governance to transform city infrastructures and services (Bakıcı et al., 2013). Moreover, the study investigates the relationship between smart tourism technology (STT) and smart destinations, evaluating how STT may influence experience in smart destinations in terms of accessibility, informativeness, interactivity, personalization, and security. According to Sustacha et al. (2023, p.2) "STTs are the basic infrastructure that integrates hardware, software and networks, travel services, and ICTs to provide real-time data to facilitate smarter decision-making by destination stakeholders. They include a variety of solutions, such as the internet of things (IoT), cloud computing, artificial intelligence, mobile devices and applications, big data, Wi-Fi, virtual reality, augmented

reality, chatbots, wearable devices, QR codes, near field communication (NFC), radio frequency identification (RFID), social networks and beacons". Overall, STTs encompass a broad range of applications that can enrich tourists' experiences and generate additional value at the same time. Findings confirm that STT positively impacts the tourism experience, with interactivity and informativeness being the key attributes that enhance visitor satisfaction. However, security and privacy during the applications usage negatively affect the experience.

The last article within the third category conducts a computer-assisted qualitative data analysis (CAQDA) to analyze hospitality and tourism technology literature, for the purpose of understanding the last 10 years' research trends (Lee, 2022). Moreover, this study divided and compared two groups of analysis: the former from 2010 to 2014 was composed by 78 articles while the latter, from 2015 to 2019, by 140. In the first group the most used and common words were "use", "hotel", "tourism", "technology", "service", "information", "industry", "sites", "analysis" and "systems". In the second group new nouns emerged: "twitter", "smart", "TripAdvisor". Therefore, initially the studies focused on hotel management, performance and websites, while later the attention shifted to social media, smart tourism and digital platforms such as TripAdvisor and Twitter. All that suggests that the topic on the use of innovative technologies in tourism has obtained considerable research attention.

4) Experience - The fourth category includes studies that analyze how AI and intelligent automation enhancing personalization, improving the customer experience, and increasing operational efficiency. Doborjeh et al. (2022) explored the impact of artificial intelligence in the tourism and hospitality sectors. The main findings of the study highlight that artificial intelligence (AI) has a significant impact on the tourism and hospitality sector, enhancing demand forecasting, tourist behavior analysis, and customer experience. The most effective AI technologies include machine learning algorithms, artificial neural networks, and deep learning, particularly for analyzing complex and multimodal data. Additionally, emerging applications such as virtual reality, augmented reality, robotics, and chatbots are transforming the industry by offering personalized experiences and improving operational efficiency. Finally, the study proposes new research approaches, such as personalized AI models and the concept of neuro-tourism, to deepen the understanding of tourist behavior. Similarly, another study explores how AI and big data can enhance individuals' behaviors and attitudes, explorations of visitor attitudes, customer satisfaction and preferences (Lv et al., 2021).

Bulchand-Gidumal (2020) explored the impact of Artificial Intelligence (AI) in the travel, tourism, and hospitality sectors. The article examines how AI applications, such as personalization systems, chatbots, robots, forecasting tools, and language translation applications, are transforming the travel and hospitality industry. Findings of the study highlight that AI is revolutionizing the travel and hospitality industry by enhancing personalization, improving customer experiences, and increasing operational efficiency. Applications such as smart travel assistants, chatbots, and recommender systems help tailor services to individual preferences, while robots and automation optimize resource allocation. However, the study highlights challenges related to AI adoption, including tourists' concerns about privacy, ethical biases in AI, and the risk of human workforce substitution. The future of AI in tourism is seen as a balance between human-AI collaboration and technological advancements, with significant potential to improve sustainability and innovation. Tussyadiah (2020) said the same about it.

Ghesh et al. (2024) explored the AI-enabled customer experience (AICX) in tourism, focusing on customer-facing AI technologies (such as chatbots, service robots, virtual/augmented reality, and intelligent voice assistants) and their impact on customer satisfaction and engagement. The main findings of the study highlight that AI enhances personalization and customer interaction across the journey but requires integration with human touch to address concerns like trust and emotional engagement. Bulchand-Gidumal (2020) underlined the same about service encounter experiences.

Solakis et al. (2024) explored the factors that affect value co-creation (VCC) through artificial intelligence (AI) and automation in tourism and hospitality. The study identifies customer-based factors such as trust, attitude, and hedonic motivations, as well as technologies like service robots, mixed-reality tools, and chatbots, that drive co-creation. This research adopts a general literature review approach, analyzing existing studies on psychological and technological elements influencing VCC in tourism. The main findings of the study highlight that customer perceptions, trust, social influence, and prior experiences significantly influence participation in VCC processes enabled by AI. Key technologies, such as service robots, AI-powered kiosks, chatbots, and mixed-reality tools, facilitate more personalized and efficient co-creation experiences. These findings suggest that tourism firms should integrate AI strategically to optimize customer engagement and satisfaction while improving service innovation.

Another study examines how artificial intelligence (AI) innovations can enhance tourist satisfaction and encourage continued service usage in the tourism industry. Findings of the study indicate that AI innovation and new product advantages significantly enhance perceived functional benefits, which in turn strengthen tourist satisfaction and their intention to continue using AI-powered services following Ku and Chen's research model validated through both quantitative and qualitative analysis. Therefore, functional benefits play a crucial role in shaping user satisfaction and loyalty. Functional benefits "are regarded as the external advantages of products or services and are usually related to the product attributes tourists select" (Ku & Chen, 2024, p. 3). Continued service usage intention "by tourists reflects a motivational influence that drives their behavior" (Ku & Chen, 2024, p. 4). The results highlight the importance of aligning AI innovation with strategic business goals to maximize its impact on customer experience and service adoption.

Research limitations. *One potential limitation of our research is that it only considered articles published between 2018 and* 2024: *on the one hand this guarantees the topicality of the results, that is reflecting the current state of art, and on the other hand, it excludes that some older contributions can provide useful insights on the historical development of*

artificial intelligence and emerging technologies in tourism and in the hospitality, thus representing the latter a limitation of the research. Another limitation is that we do not consider industrial sources and company reports. These documents could offer alternative perspectives and provide additional insights that we may have overlooked, as our evaluation was limited to peer-reviewed academic articles.

Managerial implications. *From a theoretical perspective, this paper contributes to the literature on AI in tourism/hospitality field by providing the SITE framework, which provides a model for future research, permitting scholars to examine the development of AI in tourism industry. Moreover, it enables future research to have a less fragmented view of this topic. From a practical perspective, the study offers to tourism marketers some insights on 4 different aspects of the tourism industry. Specifically, results show that AI may be used as a marketing tool during the entire process of purchasing, which is capable of enhancement of the customer experience during the pre-purchase, passing from the experience itself to the post-purchase. Moreover, AI could be implemented as a strategic tool to enhance sustainable tourism, so that managers could customizing the tourism experience to attract tourists and to differentiate the service/product. In addition, AI may make tourism less environmentally impactful, and contribute to possible reduction of CO2 emissions (Kim et al. 2024a). Finally, AI offers the opportunity to automate processes and personalize the service using VR, AR as chatbots, robots, instant language translation applications, automatic check-in and check-out, virtual agents which make travel planning less difficult, giving users support during the whole process and along the entire chain (Bulchand-Gidumal, 2020). The SITE framework may also work as a theoretical support for private organizations, managers and scholars, and might serve as a guide for DMOs and policy makers.*

Originality of the paper. *Unlike existing literature, which analyzes these issues independently - focusing separately on technological, economic or experiential impacts - our study proposes a more structured and mixed approach through the development of the SITE Model. This innovative framework organizes and classifies academic research into four key areas, offering a systematic and integrated view. The SITE Model not only provides a new tool for understanding the adoption and impact of AI and emerging technologies in tourism and hospitality but also underlines the research gaps that need to be filled in, thus supporting academics and practitioners in building more effective strategies for innovative, sustainable and customer experience-driven tourism.*

The four proposed dimensions (Sustainability, Impact, Technology, Experience) were identified inductively through a thematic analysis of the existing literature and reflect the most frequently recurring topics in studies focused on the role of digital technologies within the tourism and hospitality sector. This classification is descriptive in nature and provides an initial framework that helps to organize and understand the main areas of interest and research on the subject.

Keywords: *Artificial Intelligence; Emerging Technologies; Tourism; Hospitality; Digitalization in Tourism; Hospitality Management*

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The Power of Transparency: Can Disclosing AI-Generated Advertising Enhance Consumer Perceptions, Attitude, and Dispositions?

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Abstract

The growing diffusion of Artificial Intelligence (AI) in the advertising sector has led to new opportunities and challenges for companies that use social media to promote their products and services. In particular, the use of Generative AI (gen-AI) is increasingly transforming advertising content creation. However, despite the evident potential for creative automation, the effect of declaring AI use on consumer perceptions, attitudes, and behaviors toward ads remains underexplored. This study examines the impact of declaring the use of Artificial Intelligence (AI) in social media advertising on consumer perceptions, attitudes, and behaviors. Two experimental studies with 554 Italian participants reveal that AI declaration significantly enhances advertising credibility and language comprehension. Users are more willing to like and share ads when AI use is disclosed regardless of the product category. These findings suggest that transparency in AI-generated content can improve consumer engagement and brand perception, offering valuable insights for marketers, while highlighting the need for further research exploration of ethical and regulatory concerns.

Framing of the research. *Digital transformation (DT) is a ubiquitous phenomenon that involves different aspects of our daily lives, radically shaping economic, social, and cultural scenarios (Padua, 2021). At the center of this revolution are several new digital technologies - such as the Internet of Things (IoT), Wearable Devices, Blockchain, Augmented Reality (AR), Virtual Reality (VR), Biometric Authentication, and Artificial Intelligence (AI) -, and their application in disparate domains. In this respect, recent research is increasingly focused on the implementation of these new technologies in healthcare (e.g., Agbo et al., 2019; Van Hauwaert et al., 2024), financial management (e.g., Budiasih, 2024), energy and sustainability (e.g., Neves et al., 2024), and marketing (e.g., Diaz et al., 2022; Srivastava and Bag, 2024). Concerning the latter domain, Calderon-Monge and Ribeiro-Soriano (2024), recognizing that the acceptance and management of social media are valid marketing strategies, have highlighted the relevant role of social media campaigns through new digital technologies in enhancing consumer engagement and managerial relations. As stated by Diaz et al. (2022), as a consequence of the explosion in social media marketing, recent studies have explored company-generated or brand-generated content - such as advertising campaigns - in social networks (e.g. Facebook page or X feed) through the analysis of customer behavior (Lee et al., 2018; Meißner et al., 2019).*

From the consumer perspective, social media has turned into a resource of inspiration, entertainment, and news. From the firm perspective, social media has become one of the most effective digital marketing channels (Peter and Dalla Vecchia, 2021), with most companies embracing the power of social networks as never before. As the number of social network users persists to increase and consumer shopping behavior is more and more impacted by the activities on, among others, Instagram and TikTok, marketers strongly leverage these networks' drawing power for promotion and advertising. As reported by Statista (2024), in 2023, social media advertising spending stood at approximately 270 billion U.S. dollars, with the expenditure predicted to exceed the 300-billion-dollar mark by 2024[5]. Advertising spending is expected to show an annual growth rate (CAGR 2024-2029) of 8.11%, resulting in a projected market volume of 345 billion U.S. dollars by 2029. Moreover, in the social media advertising market, the number of users is expected to amount to 6,265.00m users by 2029 (Statista, 2024). Finally, Statista (2024) also reports that global spending on social media advertising has more than doubled since the COVID-19 outbreak, reaching 226 billion U.S. dollars in 2022. This scenario and these growing trends underline the concrete opportunities that social media offers to businesses in terms of promoting and advertising their products and services.

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In the lens of advertising, among the new digital technologies, Artificial Intelligence (AI) sees wide applications (e.g., Vakratsas and Wang, 2020; Başev, 2024; Park et al., 2024; Bhusan, 2024), and its integration represents a paradigmatic change in contemporary marketing strategies. In its basilar definition, AI refers to "computer software that imitates human thoughts and actions and is open to development" (Başev, 2024, p.168). Then, in advertising, AI implies the replication of human intelligence within machines, enabling them to think and respond in ways akin to humans based on input data. As reported by Başev (2024), several brands (e.g., Burger King, Netflix, Spotify, National Geographic, and Harley Davidson) utilize AI in roles such as copywriting, editing, and other functions to enhance their collaboration with AI in the advertising sector. One aspect of AI that became prominent in the advertising industry is represented by Generative Models. An example is Generative Artificial Intelligence, commonly known as "Generative AI" or "Gen AI" (Euchner, 2023). According to Zhou and Lee (2024), such generative models allow humans to be directly involved in the creative process through, for example, text-to-image systems (e.g. DALL-E, Midjourney, or Deep AI) or by involving in an open dialog with transformer-based language models (e.g., Claude, Bard, or ChatGPT). Generative AI is expected to become more potent to automate even more creative tasks typically reserved for humans and generate significant economic value in the future years (Huang and Grady, 2022).

However, while on the business side adopting these generative AI tools could be a positive strategy able to support content creation, and campaign optimization within the advertising landscape, on the consumer side, the widespread use of generative AI is raising questions about the transparency and authenticity of digital content. The threat of deepfake images and videos used in contexts such as advertising campaigns has prompted politicians and regulators to come up with proposals to prevent their use. To address these challenges, a series of tech companies (i.e., Adobe, Microsoft, Nikon, Leica, Camera Bits, Truepic e Publicis Groupe) have proposed the Coalition for Content Provenance and Authenticity (C2PA) protocol[6], which uses cryptography to track the origin of digital content. Specifically, the pioneering "transparency icon" of the C2PA will use the symbol with the initials "CR" which stands for "Content CRedentials". Operatively, the Content CRedentials symbol can be incorporated into image, video, and PDF metadata via photo and video editing platforms. On the user's side, when they encounter online content marked with the acronym "CR", with a click on the symbol they can identify the rightful owner, find information about the AI tools used in the creation of the content, as well as insights into the production process[7].

Purpose of the paper. *Proposals by politicians and regulators to prevent the use of deepfake images and videos in contexts such as advertising campaigns highlight the need to regulate these aspects to protect users. In the same perspective, it becomes relevant to understand the users' perspective. Therefore, since the effects of AI-generated advertising on user perceptions, attitudes, and dispositions remain largely unexplored, this research aims to bridge this gap in the literature. Accordingly, this research aims to investigate whether declaring the use of AI (vs. not declaring it) in social media advertising creation can affect consumers' perceptions, attitudes, and dispositions. Prior research has highlighted key variables in online advertising that shape consumer responses. For instance, advertising credibility has been identified as a crucial factor affecting consumer perceptions (MacKenzie & Lutz, 1989; Eisend, 2006). Regarding attitudes, language comprehension plays a pivotal role in how advertisements are processed and understood (Puntoni et al., 2009). Additionally, consumers' willingness to engage with advertisements-such as liking and sharing-has been recognized as a key indicator of online behavioral dispositions (Berger & Milkman, 2012). Accordingly, this research examines whether the explicit disclosure of AI involvement in advertising creation impacts consumer perceptions (e.g., the credibility of the advertising), attitudes (e.g., language comprehension), and dispositions (e.g., willingness to like and share the advertising). The theoretical underpinning of this study is based on the Persuasion Knowledge Model (PKM) in the advertising context (e.g., Moore & Rodgers, 2005; De Pelsmacker & Neijens, 2012; Evans & Park, 2015). According to this theory, consumers develop knowledge about persuasion tactics and use this knowledge to interpret and respond to advertising messages (Friestad & Wright, 1994). This theory explains that consumers are aware of persuasive strategies and tend to resist persuasion when they perceive manipulation (Fransen et al., 2015; Ringold, 2002). In line with this model, transparency regarding the source and process of advertising can influence consumer reactions in terms of perceptions, attitudes, and disposition. In terms of perceptions, previous studies (e.g., Schweitzer et al., 2019; van der Heide & Lim, 2016) suggest that disclosing relevant information - as it could be AI involvement - can increase trust in advertising content. According to the Source Credibility Theory, which refers to the understanding of the believability and persuasiveness of an agent in communication (Fogg et al., 2001), the use of AI in communication could be considered such a source able to influence consumer opinions and behavior (Khan & Mishra, 2024). Therefore, we maintain that disclosing AI usage in advertising creation can enhance the perceived credibility of the advertisement, as consumers may view the brand as more transparent. In terms of attitudes, recent literature (e.g., Gao et al. 2023; Al Tawalbeh et al., 2024) demonstrated that AI can improve personalization and linguistic adaptation in advertising, making it more understandable and relevant to the target audience. Therefore, we maintain that disclosing AI usage in advertising creation may improve the consumers' advertising language comprehension as they perceive enhanced quality and adaptability in advertising communication. In terms of dispositions, recent research (e.g., Suraña-Sánchez & Aramendia-Muneta, 2024) provided evidence that AI positively affects the consumer's engagement towards advertising. Additionally, as stated by Berger and Milkman (2012), according to the PKM, when consumers perceive an advertisement as more honest and transparent, they are more likely to engage with it. Therefore, we maintain that disclosing AI usage in*

[6] https://c2pa.org/
[7] https://www.ilsoftware.it/adobe-lancia-un-nuovo-logo-per-taggare-le-immagini-generate-con-lia/

advertising creation may improve the consumers' engagement and sharing toward the advertising. Overall, building upon the Persuasion Knowledge Model - i.e., consumers are conscious of persuasive strategies also in the advertising context and tend to resist persuasion when they perceive manipulation - we assert that if the use of AI is not reported, consumers may perceive it as an attempt to deceive. On the contrary, declaring it can reduce resistance, increasing credibility, comprehension, and engagement.

Formally, we proposed the following hypotheses:

H_1: The declared use of AI (vs. not declared) positively affects the consumers' perceived advertising credibility.

H_2: The declared use of AI (vs. not declared) positively affects advertising language comprehension.

H_3: The declared use of AI (vs. not declared) positively affects the consumers' a) willingness to like and b) willingness to share the advertising.

Methodology. *We conducted 2 experimental studies. Study 1 aimed to test whether the AI's use declaration affects the credibility and the language comprehension of the advertising. The use of AI (not declared vs. declared) was manipulated in a between-subjects design, holding constant all other elements in social media advertising.[8] Study 2 aimed to obtain additional support for the previous results, by providing evidence of the generalizability of the proposed effect against a different product category[9], and to test the effects of AI's use declared (vs. not declared) on consumers' dispositions, such as willingness to like and willingness to share the advertising. Advertising credibility was captured by three 7-point items (Kim et al., 2017; Study 1 α=.88; Study 2 α=.86); while advertising language comprehension was captured by three 7-point items (Lin & Wang, 2016; Study 1 α=.80; Study 2 α=.80). In Study 2, user's willingness to like and to share the advertising were captured, respectively, by a 7-point item ("To what extent are you willing to put "like" at this advertising?", and "To what extent are you willing to put share this advertising?"), both ranking from 1 "At all" to 7 "Very much".*

Results. *Two hundred and thirty Italian users (50.4% females; M_{age}=26.50; SD_{age}=6.80) took part in Study 1 and were randomly assigned to one of the two conditions. Results of a first one-way ANOVA showed that the advertising credibility was significantly higher in the case of AI'use declared compared to not declared ($M_{AIdeclared}$=4.225, SD=1.49; $M_{AInotdeclared}$=3.554, SD=1.323; F(1, 228)=12.94, p < .000). Results of a second one-way ANOVA showed that the advertising language comprehension was significantly higher in the case of AI'use declared compared to not declared ($M_{AIdeclared}$=4.296, SD=1.208; $M_{AInotdeclared}$=3.747, SD=1.186; F(1, 228)=12.05, p < .000). Overall, these findings provide support for the effect of AI's use declared (vs. not declared) on consumers' perception of advertising credibility and consumers' attitude toward the advertising language comprehension.*

Three hundred and twenty-four Italian users (58.3% females; $M_{age=}$25.94; SD_{age}=7.12) took part in Study 2 and were randomly assigned to one of the four conditions in a 2 (AI's use: not declared vs. declared) by 2 (product category: wine vs. body wash) between-subjects design. Results of a first two-way ANOVA on advertising credibility with the use of AI (not declared vs. declared) and product category (wine vs. body wash) as between-subject factors confirmed a significant main effect of AI's use ($M_{AIdeclared}$=4227, SD=.106; $M_{AInotdeclared}$=3.699, SD=.107; F(1, 320)=12.36, p <,000). The results also showed a significant main effect of the product category (M_{Wine}=4.14, SD=.107; $M_{BodyWash}$=3.787, SD=.106; F(1, 320)=5.51, p =.019). Finally, no significant interaction effect between AI's use and product category was found (F(1, 320)=.028, p =.866). Results of a second two-way ANOVA on advertising language comprehension with the use of AI (not declared vs. declared) and product category (wine vs. body wash) as between-subject factors confirmed a significant main effect of AI's use ($M_{AIdeclared}$=4.379, SD=.090; $M_{AInotdeclared}$=3.869, SD=.091; F(1, 320)=15.867, p < .000). They also showed a significant effect of the product category (M_{Wine}=4.298, SD=.091; $M_{BodyWash=}$3.95, SD=.090; F(1, 320)=7.391, p =.007). No significant interaction effect between AI's use and product category was found (F(1, 320)=.884, p =.348). Overall, these findings suggest that the effect of AI's use declared (vs. not declared) on consumer perception of advertising credibility and consumer attitude toward the advertising language comprehension holds regardless of the product category, then provide preliminary evidence of the generalizability of the proposed effects.

Finally, we tested the user's dispositions (i.e., willingness to like and willingness to share the advertising). Results of a first two-way ANOVA on willingness to like the avd, with the use of AI (not declared vs. declared) and product category (wine vs. body wash) as between-subject factors showed a significant main effect of AI's use ($M_{AIdeclared}$=3.658, SD=,146; $M_{AInotdeclared}$=3.122, SD=.146; F(1, 320)=6.741, p=.01). The results also showed a significant main effect of the product category (M_{Wine}=3.733, SD=.146; $M_{BodyWash}$=3.007, SD=.146; F(1, 320)=13.752, p=.000). Finally, no significant interaction effect between AI's use and product category was found (F(1, 320)=.011, p=.915).

Results of a second two-way ANOVA on willingness to share the advertising, with the use of AI (not declared vs. declared) and product category (wine vs. body wash) as between-subject factors confirmed a significant main effect of AI's use ($M_{AIdeclared}$=2.67, SD=.129; $M_{AInotdeclared}$=2.288, SD=.130; F(1, 320)=4.365, p=.037). The results also showed a significant main effect of the product category (M_{Wine}=2.774, SD=.130; $M_{BodyWash}$=2.183, SD=.129; F(1, 320)=10.437,

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8 The stimulus was an advertisement on the Instagram platform that used wine as a product category. It was entirely created by an AI-generative tool. In particular, ChatGPT is used for the creation of the text part, while DeepAI is used for the creation of the visual part. The manipulation of the Artificial Intelligence use (not declared *vs.* declared) was made by inserting a logo with the words "created with AI" placed at the bottom right of the visual part of the advertising, and a logo with the words "Content created with Artificial Intelligence" placed at the end of the textual part of the advertising (see Appendix).

9 Body wash. The use of AI (not declared *vs.* declared) was manipulated as in Study 1.

p=.001). Finally, no significant interaction effect between AI's use and product category was found (F(1, 320)=.003, p=.956). Overall, these findings indicate that users are more willing to like and share the advertising when the use of AI is declared.

Research limitations. *While this study establishes a main effect of AI disclosure (vs. not disclosure) on consumers' perceptions, attitudes, and dispositions, it does not explore potential moderators (e.g., consumer familiarity with AI, brand reputation, or product involvement). Future research could investigate how these variables influence the effect of AI disclosure on perceived advertising credibility, advertising language comprehension, and consumers' willingness to like and share the advertising. Moreover, the study focuses on outcome variables (credibility, comprehension, and engagement) without fully unpacking the cognitive and affective mechanisms driving these effects. Future research could explore whether AI disclosure influences perceived authenticity, skepticism, brand confidence, perception of honesty, or trust- key psychological constructs in AI-related marketing research. Additionally, although the study investigates two product categories (wine and body wash), it does not account for other potentially influential product categories or industries. It is possible that the impact of AI declaration in advertising may differ across product types (e.g., technology products vs. consumer goods or experience goods), and further studies could explore this potential moderation. In addition, further research could include a variety of advertising platforms to see if similar effects are observed across different digital environments. Finally, the study is based on Italian consumers, which may limit generalizability across cultural contexts. Given that attitudes toward AI transparency may vary by country, industry, or regulatory environment, cross-cultural comparisons could provide further insights.*

Managerial implications. *The study highlights the importance of declaring the use of AI in the creation of digital advertisements by suggesting some managerial directions. Marketers could emphasise transparency by openly disclosing the use of AI tools in their advertising campaigns. This transparency could enhance the perceived credibility of the advertisement, which is crucial in building trust with consumers. Users might appreciate the transparency of the firm and develop positive attitudes and dispositions towards the advertising. This novel finding has important implications for how businesses integrate AI into their advertising strategies and how transparency can build consumer trust. In this direction, these results suggest that the declared use of AI as an advertising creator can be considered an extension of the source credibility theory (Khan & Mishra, 2024). Thus, even advanced technologies, like gen-AI, can become a credible source when explicitly declared and, in turn, enhance user engagement in social media advertising. Improving advertising credibility and user engagement could have effects on the brand, opening up opportunities to study how the perception of the advertising indirectly affects the perception of the brand that promotes it. Additionally, considering that the results suggest that users are more likely to engage with advertisements that disclose the use of AI, as shown by their increased willingness to like and share the advertising, businesses should strategically use AI-generated content to improve user engagement and social media interactions. By fostering this engagement, companies can increase the reach and effectiveness of their advertising campaigns. Moreover, these results demonstrate that AI can be an effective tool in creating advertisements that resonate with consumers. Marketers should not shy away from using AI in creative tasks such as copywriting and content optimization, as long as the use is declared. AI's ability to enhance the overall quality of advertisements-by improving credibility and comprehension-could be a competitive advantage for companies looking to stand out in crowded social media spaces.*

Originality of the paper. *This paper introduces a novel angle in advertising research by exploring the effects of declaring AI's involvement in the creation of social media advertisements. While AI's role in digital marketing is widely discussed, few studies have specifically focused on how transparency regarding AI use can influence consumer perceptions, attitudes, and behavioral intentions. Moreover, by examining the impact of AI declaration on consumer perceptions (advertising credibility), attitudes (advertising language comprehension), and dispositions (willingness to like and share the advertising), the paper provides a comprehensive framework to understand the multifaceted effects of AI transparency on consumer behavior in advertising. This holistic approach contributes to a more nuanced understanding of consumer engagement with AI-generated content.*

Key words: *Artificial Intelligence; Social media advertising; Advertising credibility; Advertising language comprehension; Willingness to like; Willingness to share.*

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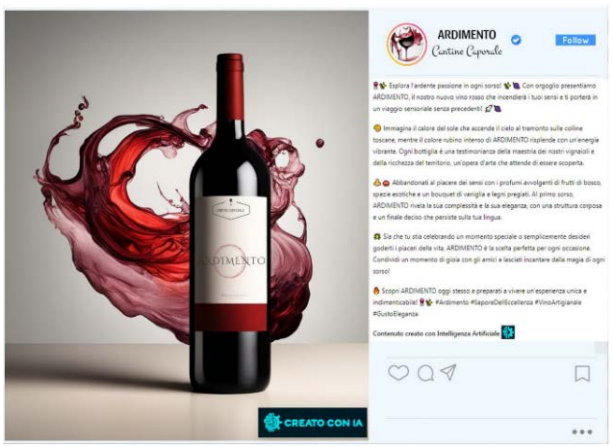
Appendix

Examples of stimuli used in the experimental studies - *wine version*



Enhancing the Identity of Made in Italy: The Role of Augmented Reality in the Food Sector

Analysis of U.S. Consumers' Purchase Behavior

VALERIA VIGNOLI[1]

Abstract

In a context of significant growth in Italian food exports, the "Made in Italy" label plays a central role, projecting an image of Italy as a rich country in cultural values such as innovation, lifestyle, tradition, history, prestige, and quality. However, the phenomenon of "Italian Sounding" risks confusing consumers, making it essential for marketing professionals to provide greater transparency regarding authenticity of food products. Recent studies have demonstrated that the use of Augmented Reality (AR) can influence consumer behavior, driven by the desire to understand product origins. However, the literature has yet to explore how this technology, applied to transparent communication, can raise awareness of the true provenance of food products.

This research examines the use of Augmented Reality (AR) as a tool to enhance awareness of the authenticity of Italian products through transparent and immersive disclosure. The results of this research, based on a sample of U.S. consumers, show that immersive disclosure significantly and positively increases both authenticity awareness and purchase intentions compared to traditional disclosure methods.

The study suggests that technological innovation represents a key strategy for protecting the value of "Made in Italy" and mitigating the effects of "Italian Sounding", providing relevant insights for both Italian food producers and importers motivated by more conscious purchasing decisions. Moreover, the results indirectly address government authorities, chambers of commerce, and export funding agencies, emphasizing the importance of safeguarding the "Made in Italy" label through tools that foster technological innovation within businesses.

Framing of the research. *According to the Economic Observatory of the Ministry of Foreign Affairs and International Cooperation (M.A.E.C.I.), in 2023, Italy exported goods worth a total of 626.2 billion euros, generating an increase of 5.3% compared to the previous year. Specifically, the food sector achieved a historical record for exports, reaching a value of 64 billion euros, representing more than 10% of total Italian exports (Fortune Italia, 2024; Ismea, 2024; M.A.E.C.I., 2024). The most significant foreign markets for food exports are the United States, France, and Germany, which serves as the main destination market.*

In the context of exports, "Made in Italy" plays a significant role, representing a brand of guarantee for international consumers and offering a positive perception worldwide. The term "Made in Italy," in its literal interpretation, refers to goods and services produced within Italian borders. However, this expression requires a broader interpretation: it evokes in the consumer's mind an image of Italy as a country with its cultural values such as innovation, lifestyle, attitude, history, social life, prestige, and quality (Pellegrini, 2016; Temperini et al., 2016). While consumers show a positive attitude toward Italian values, this phenomenon can lead to the improper use of the term, creating a sort of "trap" for the consumer. Many products, although conceived in Italy, are manufactured in other countries and then enriched and distinguished by elements that still evoke the concept of "Italianity." Indeed, the Italian market, known for its high quality standards, faces a worrying phenomenon known as "Italian Sounding," which is primarily widespread in the food sector (Montanari et al., 2016).

The term "Italian Sounding" refers to a commercial practice in which non-Italian products are promoted using names, images, colors, symbols, or designs that evoke Italy, misleading the consumer into believing that they are authentic products (Agrifood.tech, 2020). Therefore, it can be considered an ethically improper marketing strategy, as the intent is to exploit the appeal of Italian identity and the reputation of the "good table," distorting the consumer's perception. A study conducted by Ismea (Institute of Services for the Agricultural Food Market), in collaboration with The European

House - Ambrosetti, shows that the phenomenon of "Italian Sounding" represents a value of 11.7 billion euros (Ismea, 2024). Although this phenomenon is widespread abroad, its consequences are particularly important for the Italian economy, as it affects food exports. Besides the economic damage, this phenomenon leads to the deterioration of the image and reputation of "Made in Italy." The goal of Italian businesses and government bodies is to enhance and protect the identity of the "Made in Italy" brand, preventing the image of excellence from being compromised, generating consumer distrust, and a wrong perception of product authenticity.

According to research conducted by Mazzù et al. (2022) on Chinese consumer behavior toward "Made in Italy" products, it has emerged that these consumers have become increasingly attentive and demanding over the years. They

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not only seek quality and authenticity in products, but they also desire active and immersive involvement with them through the use of specific digital platforms (Mazzù et al., 2022). Therefore, it is crucial for companies to adopt innovative, immersive, and engaging strategies that can strengthen consumer trust while protecting and enhancing the "Made in Italy" brand.

According to Rauschnabel et al. (2019), AR integrates informational content directly into the user's perception of the real world through an interactive, immersive, informative, and satisfying experience, overlaying or adding digital content such as text, geolocated information, graphics, audio, and video in real-time to the view of physical objects and environments (Du et al., 2022).

This technology, through the use of digital devices, has been integrated into marketing and sales strategies, allowing marketers to create authentic storytelling and enhance customer experience. Indeed, the final consumer has the opportunity to better understand product information and develop a simplified and interactive purchasing decision-making process (M. Claudia Tom Dieck & Dai-in Danny Han, 2022).

Recent studies have shown how the use of Augmented Reality (AR) can influence consumer behavior, driven by the desire to know the product's origin, where authenticity and origin are crucial aspects (Mazzù et al., 2023). However, the literature has not yet explored how this technology, applied to transparent disclosure, can generate awareness about the true origin of food products.

This research aims to explore how the use of Augmented Reality, through immersive disclosure, can influence consumer awareness regarding the authenticity of "Made in Italy" products and, consequently, their purchase intention. The hypothesis is that transparent and immersive communication can enhance the perception of authenticity of these products. Furthermore, it investigates how awareness of authenticity can mediate the relationship between the use of Augmented Reality and purchase intention.

The term "disclosure" in food marketing is widely studied and discussed in literature; it refers to marketers' actions aimed at informing consumers about certain facts regarding a product or service (Wilkie, 1986). Specifically, it involves the transparent disclosure of food product information, expressed in various forms, such as the origin of ingredients, production methods, nutritional information, and potential health risks (Freeman, 2015; Stewart & Martin, 2004). Transparent communication offers value to the consumer and promotes a more informed consumption attitude, influencing food behaviors (Oprea, 2023).

There are various forms of disclosure, both traditional and innovative, that use digital technologies to allow consumers to access detailed product information in real-time. Although existing literature has analyzed the impact of traditional tools on information comprehension and consumer behaviors, there is a significant research gap regarding the use of immersive digital tools, such as Augmented Reality. The use of Augmented Reality (AR) in marketing presents a wide range of opportunities: AR allows consumers to test products repeatedly before purchase, facilitating the customer decision journey (Matarazzo et al., 2020). Indeed, consumers are more likely to engage with products through interactive experiences where AR offers immediate access to product information, promoting transparency and stimulating consumer trust, especially in markets where the phenomenon of "Italian Sounding" is widespread (Mazzù et al., 2023; Scholz & Smith, 2016; S.M.C. Loureiro et al., 2019). A study conducted by eMarketer on the trend of users engaging with Augmented Reality applications shows a steady increase in the number of individuals accessing AR content at least once a month on any device. The data show that users increased from 59.4 million in 2019 to 95.5 million in 2023, with a projections indicating a further rise to 106.9 million by 2027 (eMarketer, 2023). This trend highlights the increasingly widespread adoption of Augmented Reality, driven by the growing integration of immersive technologies into everyday life.

For these reasons, U.S. companies are increasingly investing in AR solutions to enhance customer engagement and experience. A notable example is Starbucks, which launched an application allowing customers to scan products in-store using their smartphones, enabling them to see the items come to life on screen while also providing additional product information in an engaging and innovative way.

This technology could offer new perspectives on how information regarding food products may be perceived and processed by consumers. So, this research examines how immersive disclosure through Augmented Reality influences consumer perception and behavior toward food product information.

Framing Purpose of the paper. *The literature offers various definitions, characteristics, and opportunities related to Immersive Realities, such as Augmented Reality. However, few applications of this technology are focused on the concept of disclosure for "Made in Italy" products, with the goal of enhancing brand identity and preventing improper uses.*

In particular, the study proposes a Conceptual Framework as a mediation model that examines the effect of immersive disclosure (vs. traditional) on food products, evaluating its impact on consumer awareness of the authenticity of "Made in Italy" products and the subsequent purchase intention. In other words, the analysis will focus on the potential offered by Augmented Reality (AR), applied to the transparent disclosure of food products, can provide information capable of increasing consumer awareness of the true origin of Italian products. The term "awareness of authenticity" refers to the level at which consumers recognize and understand the true origin of "Made in Italy" products. On one hand, according to Munoz et al. (2006), "authenticity" refers to something original, genuine, unique, traditional, and real. On the other hand, it refers to the connection with the territory, the production method, and the quality of the product (Beverland, 2006). Awareness plays a crucial role, as it enhances positive consumer perception by appealing to their desire to understand a product's origins, with authenticity and provenance being key factors. (Mazzù et al., 2023).

Based on the above, the following hypotheses are proposed:

- *H1. An immersive disclosure vs. traditional disclosure positively influences consumer awareness of the authenticity of "Made in Italy" products.*
- *H2. Consumer awareness of the authenticity of "Made in Italy" products positively influences purchase intention.*
- *H3. There is a positive relationship between immersive disclosure and purchase intention, mediated by the awareness of authenticity of "Made in Italy" products.*

The proposed hypotheses were analyzed using a quantitative methodology with an experimental mediation model through the SPSS platform.

Methodology. *A sample of one hundred and twenty-five respondents from the United States participated in the study, including eighty-nine women (71.2%), thirty-two men (25.6%), three individuals who preferred not to respond (2.4%), and one participant who did not disclose their gender (missing). They completed an online questionnaire via the Qualtrics platform.*

Particular attention was given to the involvement of U.S. consumers with no familial ties to Italy, ensuring that the responses provided by the participants were as unbiased and authentic as possible, thereby avoiding potential biases related to emotional attachment to the country of origin of the product shown.

Demographically, most participants were in the age group between 30 and 49 years old, representing 38.7% of the total sample (48 individuals), followed by those in the 50 to 70-year-old group (29.8%; 37 respondents), while the 18 to 29- year-old group accounted for 28.8% of participants (36 individuals). Only one individual was excluded from the demographic analysis for not disclosing their age (missing), and the remaining 2.4% of participants were over 70 years old (3 individuals).

Most participants reside in the Western U.S. (43.5%), followed by the South (27.4%), the Midwest (15.3%), and the Northeast (12.9%), with only 0.8% from Hawaii or Alaska. Participants were briefed on the research objectives and assured anonymity before being randomly assigned to one of two questionnaire versions, dividing them into two groups:

- *The control group (N = 64; 51.2%), which was shown an image of the "extra virgin olive oil" product in traditional format, with no indication of the product's origin.*
- *The experimental group (N = 61; 48.8%), which was shown the same image but with Augmented Reality (AR) stimulus.*

An attention check was placed below the image to verify the actual viewing and attention to the presented scenario.

The stimuli differed in how product characteristics were displayed, with the control group shown an image without Augmented Reality elements. In this case, product characteristics like origin and nutritional values were displayed on a standard label (traditional disclosure). The experimental group viewed the same olive oil bottle with AR elements, where scanning an AR code provided interactive information about the product's origin, quality, and traceability.

The reason to consider extra virgin olive oil as a representative "Made in Italy" product is supported both by literature and by the latest market data: several studies have considered extra virgin olive oil a particularly relevant product for ensuring proper monitoring and transparency of its characteristics (Zhang et al., 2012). After viewing the image, each participant was required to answer a series of questions to express their judgment concerning the variables in the mediation model.

To examine the variable "awareness of the authenticity of "Made in Italy" products," the 7-item scale by Marozzo et al. (2022) was used, following an analysis of the Cronbach's Alpha statistic for the elimination of item #5. With a result of 0.891 for the 7 items ($\alpha = 0.891$), the reliability of the scale was confirmed.

For the variable "purchase intention," the 7-item scale by Dodds, Monroe, and Grewal (1991) was considered, with items #2 and #3 removed. The results show that Cronbach's Alpha was 0.960 ($\alpha = 0.960$), suggesting that the scale is reliable despite the removal of the items. Furthermore, for a description of the sample, the study focused on the demographic and behavioral analysis of U.S. consumers regarding "Made in Italy" products and the use of Augmented Reality. The participants were thanked for their participation.

Results. *The analysis reveals that a significant part of the sample values transparency in food product information.*

The results show that 33.6% of participants find transparency "extremely important," 47.2% rate it "very important," and 19.2% consider it "moderately" or "not very important" in the pre-purchase phase. Familiarity with the "Made in Italy" brand is varied: 39.2% know it "very well" or "extremely well," 32% are "moderately familiar," 18.4% have limited knowledge, and 10.4% are unfamiliar with it. It is noted that 66.4% of participants report that the label significantly influences their perception. Not surprisingly, 45.6% consider it "very" or "extremely important" for a food product to be labeled as "Made in Italy," compared to 29.6% who find it "moderately important" and 24.8% who consider it "not very" or "not important at all." Moreover, 82.4% of participants consider "Made in Italy" products to be of good quality.

Regarding consumer behavior toward the use of AR, 69.6% of the sample has never used Augmented Reality applications, while the remaining 30.4% reported using them. Of the 69.6%, the results show that 33.6% are "very willing," followed by 25.6% who are "moderately willing." Only 10.4% say they are not at all inclined to use such applications. This suggests there is potential interest in using Augmented Reality if it offers detailed and interactive information about food products.

From the analysis of the data collected after exposure to the stimuli, it can be stated that, in general, regardless of the type of stimulus shown, all respondents, on average, are "rather agree" with the following statements ($M_{Authenticity} = 5.01$; $SD = 1.206$); the extra virgin olive oil shown:

- *is a genuine product;*
- *is an original product;*
- *is a true product (not altered);*
- *is a typical product;*
- *is unique in its kind;*
- *reflects its place of origin;*
- *is a typically Italian product.*

Upon further examination using the t-test, the results revealed that participants perceive a different level of authenticity depending on the type of stimulus presented: the experimental group (exposed to the image with an immersive AR disclosure) perceives, on average, greater authenticity compared to the control group exposed to an image with a traditional disclosure ($M_{Authenticity\ Immersive\ Disclosure} = 5.56$; $SD = 1.250$ vs. $M_{Authenticity\ Traditional\ Disclosure} = 4.49$; $SD = 0.898$; $t(108.494) = 5.476$; $p<0.001$). An immersive disclosure using Augmented Reality leads to higher perceived authenticity than traditional disclosure.

Regarding the dependent variable "purchase intention," the results show that, on average, the experimental group have a higher agreement level compared to the group that viewed the image with traditional disclosure. These results are confirmed by the t-test. Specifically, participants in the experimental group have, on average, a greater purchase intention than the control group ($M_{Purchase\ Intention\ Immersive\ Disclosure} = 5.43$; $SD = 1.188$ vs. $M_{Purchase\ Intention\ Traditional\ Disclosure} = 4.22$; $SD = 1.268$; $t(123) = 5.504$; $p<0.001$).

As expected, the results show that participants have a distinct purchase intention based on the stimulus presented. Again, it can be concluded that people who saw the product with immersive disclosure, on average, had a significantly higher purchase intention score than those exposed to a traditional disclosure.

The research continued by evaluating the effect of the type of disclosure (immersive vs. traditional) on purchase intention, mediated by the awareness of the authenticity of "Made in Italy" products using the SPSS PROCESS Macro, Model 4 (Hayes, 2013). Specifically, the model considered the following variables:

- *Independent variable (X) is the type of disclosure (innovative vs. traditional);*
- *Dependent variable (Y) is purchase intention;*
- *Mediator variable (M) is awareness of the authenticity of "Made in Italy" products.*

The goal was to test hypotheses H1, H2, and H3, present in the Conceptual Framework. Initially, the effect of the type of disclosure on authenticity (mediator) was analyzed. The effect was positive and statistically significant ($b = 1.071$, $SE = 0.194$, $t(1,123) = 5.519$; $p<0.001$). Specifically, when the disclosure is immersive, compared to traditional disclosure, the authenticity is higher by 1.071.

The impact of disclosure type (independent variable) and authenticity (mediator) on purchase intention was analyzed. Specifically, the effect was positive and statistically significant by 0.348 ($b = 0.348$; $SE = 0.174$; $t(2,122) = 2.004$; $p = 0.047$). Moreover, observing the impact of authenticity awareness on purchase intention, another positive and statistically significant effect of 0.806 was observed ($b = 0.806$; $SE = 0.72$; $t(2,122) = 11.164$; $p < 0.001$).

To verify hypothesis 3, it was necessary to synthesize the total, direct, and indirect effects observed. Analyzing the total effect, it can be noted that the scenario is statistically significant, with a positive effect of 1.211 and a 95% confidence interval for the coefficient ranging from 0.776 to 1.647 ($b = 1.211$; $SE = 0.22$; $t(1,123) = 5.504$; $p < 0.001$; CI 95% = 0.776, 1.647). Specifically, a statistically significant total effect ($p < 0.001$) of 1.211 is observed, of which 0.348 is due to the direct effect ($p = 0.047$) and the remaining 0.863 is due to the indirect effect.

Moreover, for the indirect effect, a 95% confidence interval was observed, ranging from 0.524 to 1.243, not including zero; therefore, it can be stated that this effect is statistically significantly different from zero. The statistically significant and positive total effect ($b = 1.211$, $p < 0.001$) consists of a weaker direct effect ($b = 0.348$, $p = 0.047$) and a stronger indirect effect ($b = 0.863$), suggesting that a significant portion of the influence of the type of disclosure on purchase intention is mediated through authenticity. Hypothesis 3 is confirmed.

Research limitations. *The research examines how an immersive disclosure, compared to a traditional disclosure, affects the awareness of authenticity and the purchase intention of "Made in Italy" products. However, it presents some limitations that offer opportunities for further investigations in the future.*

Firstly, the main limitation of the study lies in its geographical aspect: the responses from U.S. consumers were examined without focusing on a particular state. Considering the significant sociocultural differences between various states, it would be interesting to analyze consumer behavior by including variables like traditions and cultural influences. Secondly, it is considered crucial to expand the current research towards the use of neuromarketing tools. Specifically, it could be suggested that the sample's responses were influenced by stereotypes related to "Made in Italy." Therefore, future research could assess how psychological and emotional factors have influenced consumers' decisions regarding Italian food products. These could be used by marketers to optimize augmented reality experiences, making them more engaging and tailored to consumers' emotional desires. Furthermore, future research could analyze technological accessibility across demographics and willingness to adopt new technologies, factors that may influence perceptions of authenticity and purchase intentions. Lastly, future research could explore whether sharing personal data through AR applications affects purchase intention, providing insights into personalized marketing strategies.

Managerial implications. *The research offers valuable insights for Italian food companies seeking to differentiate themselves in the international market, emphasizing the importance of adopting innovative technologies like Augmented*

Reality (AR) to create a more authentic, transparent, and engaging shopping experience. For this reason, Italian food companies can leverage AR to enhance the authenticity of their products, make the consumer purchasing process more informed and transparent, while simultaneously strengthening their competitive position in international markets and contributing to the protection and enhancement of the "Made in Italy" brand from the phenomenon of "Italian Sounding."

Thus, while the research allows producers to guarantee the authenticity of their products, particularly against "Italian Sounding," it also provides greater security for importers in their purchasing decisions. Marketers are therefore encouraged to adopt innovative strategies that take advantage of the opportunities offered by Augmented Reality. For example, product packaging could be enhanced with an AR Code (smart labels), allowing access to additional information that enriches the consumer decision-making and purchasing process, and supports the creation of an engaging storytelling experience. Additionally, companies could implement AR experiences on their online stores, allowing customers to visualize products without the need to physically inspect them. This strategy could also be applied in digital marketing campaigns, enabling consumers to virtually explore products and interact with them.

In conclusion, the study indirectly addresses Government Authorities, Chambers of Commerce, and export-financing companies, helping them to protect the "Made in Italy" brand by promoting incentives that encourage the technological innovation of companies.

Originality of the paper. *In the context of the rapid growth of Italian food exports, the "Made in Italy" brand plays a crucial role, representing Italy as a symbol of innovation, lifestyle, tradition, prestige, and quality. However, the phenomenon of "Italian Sounding" poses a challenge to foreign trade, as it misleads consumers about the true origin of products, making greater transparency regarding the authenticity of products essential. The novelty of this study lies in the use of Augmented Reality (AR), which is of great interest in modern food marketing, and the adoption of a U.S. sample, which expands the investigation to an international context.*

Augmented Reality (AR) is considered by the literature as a technology capable of increasing consumer engagement through interactive and authentic experiences. In fact, this immersive technology not only fosters greater consumer interaction with products but also contributes to a deeper awareness and motivation to purchase. According to Poushneh and Vasquez-Parraga (2017), AR enhances three key aspects: immersion, fun, and stimulation, elements that play a fundamental role in creating an emotional connection between the consumer and the product. Furthermore, recent studies state that the use of Augmented Reality (AR) can influence consumer behavior, driven by the desire to know the origin of the product, where authenticity and provenance are crucial aspects (Mazzù et al., 2023). However, the existing literature has not yet explored how this technology, applied to the concept of disclosure within the "Made in Italy" food sector, can increase awareness of the real origin of food products. For this reason, this study investigates how an immersive AR-based disclosure can influence awareness of authenticity and, consequently, the purchase intention of Italian food products, such as extra virgin olive oil.

In other words, this research aims to explore how the use of new immersive technologies, particularly Augmented Reality, can influence U.S. consumers' awareness of the authenticity of "Made in Italy" products and their subsequent purchasing behavior. The study contributes to understanding how transparency of information can be enhanced through the use of innovative technologies, as well as enhancing and protecting the "Made in Italy" brand from the phenomenon of "Italian Sounding."

The study, based on a quantitative analysis, enriches the literature by using a sample of U.S. consumers with no emotional or family ties to Italy, ensuring unbiased and authentic responses. The analysis of the sample revealed that participants' familiarity with the "Made in Italy" brand was evenly distributed: 32% of participants were "moderately familiar" with the brand, while 39.2% knew it "very well" or "extremely well," compared to 10.4% who did not know it at all and 18.4% who had only limited knowledge of it. The data show that a significant portion of the sample places great importance on the transparency of food product information, particularly regarding the origin of ingredients, production methods, nutritional information, and potential health risks. A study conducted by Mazzù et al. (2022) on Chinese consumers' behaviors regarding "Made in Italy" products highlighted how these consumers have become increasingly attentive and demanding over the years, not only seeking quality and authenticity in products but also a strong active and immersive engagement with the product, through the use of specific digital platforms (Mazzù et al., 2022). The results of the present research show that U.S. consumers also attach great importance to quality as a purchase criterion: 97.6% of respondents agree or strongly agree on the importance of quality, while only 2.4% remain neutral. Moreover, a product labeled as "Made in Italy" is perceived as high quality by 82.4% of the sample, with quality being considered a key factor for 95.2% of respondents.

This analysis clearly shows how consumer purchasing habits are strongly influenced by perceived quality and the transparency of product information. Both Chinese and U.S. consumers share an increasing focus not only on the authenticity of products but also on more engaging and interactive purchasing experiences, made possible by the use of advanced digital technologies. This trend highlights a shift in consumer preferences, where they no longer evaluate products solely based on their intrinsic characteristics but also seek the authenticity of these products. The results confirm theories present in the literature: individuals exposed to an immersive AR-based disclosure show greater awareness of the authenticity of the product compared to those exposed to traditional disclosure. This effect is directly reflected in the purchase intention, suggesting that respondents generally expressed a higher purchase intention for products shown with an immersive disclosure.

This illustrates the opportunities and capabilities that AR offers in food marketing. Augmented Reality not only facilitates greater transparency about product features but also creates an interactive and engaging experience that enhances the perception of authenticity. This level of interactivity and immersion can strengthen the emotional bond between the consumer and the product, encouraging a more conscious and motivated purchasing behavior. This confirms Hypothesis 1 of the mediation model: "an immersive vs. traditional disclosure positively influences consumer awareness of the authenticity of 'Made in Italy' products," where the effect was found to be positive and statistically significant. Specifically, the results showed that immersive disclosure can significantly increase awareness of the authenticity of Italian food products compared to traditional disclosure. Additionally, the results from the mediation model analysis confirm Hypothesis 2, too.

This result aligns with recent literature on the use of AR, suggesting that immersive experiences can create a sense of trust and authenticity in consumers, enhancing their purchase intention (Du et al., 2022). However, awareness of authenticity not only positively affects purchase intention but also acts as a key mediating variable between immersive disclosure and purchasing behavior. Furthermore, this analysis shows that authenticity significantly mediates the relationship between disclosure type (immersive vs. traditional) and purchase intention; thus, Hypothesis 3 is also confirmed. In conclusion, in light of the literature and the results of this research, Augmented Reality can be considered an effective tool capable of increasing interactivity and transparency in "Made in Italy" food products. This translates into greater awareness among American consumers regarding the authenticity of such products, positively influencing their purchase intentions.

Keywords: *Made in Italy; Disclosure; Augmented Reality; Food Marketing; Purchase Intention.*

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Investigating Effective Health Communication Strategies to Enhance Customer Engagement in Preventive Health Behaviors

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Abstract

This work-in-progress study investigates the role of prevention in the health customer journey, focusing on effective engagement strategies for promoting preventive health behaviors. It examines how health communication strategies, combined with individual factors such as health literacy, motivation, and risk perception, effectively influence individuals' willingness and ability to adopt preventive behaviors. Adopting a multi-method approach, including focus groups and experimental designs, the study aims to provide actionable insights for healthcare professionals, policymakers, and communication strategists. The goal is to offer evidence-based recommendations for improving patient engagement in prevention and designing personalized, effective health communication.

Framing of the research.

Customer journey in healthcare

In the digital age, the customer journey has become a complex, multi-touchpoint experience, as customers interact with businesses across various channels, making the management of these interactions increasingly vital (Grewal & Roggeveen, 2020). Customer experience is best conceptualized as a dynamic process unfolding over time, involving multiple stages of the purchasing cycle, characterized by loops, detours, and repeated interactions (Lemon & Verhoef, 2016; Grewal & Roggeveen, 2020). Studying the customer journey extends beyond transactional interactions to include experience, behavioral responses, co-creation, and the impact of technology (Tueanrat, Papagiannidis & Alamanos, 2020). From a service design perspective, the customer journey encompasses both processual and experiential dimensions, providing a lens through which businesses can analyze service encounters (Følstad & Kvale, 2017).

In healthcare, the concept of the customer journey is framed as the patient journey, which can be understood through the service delivery system (Ponsignon, Smart & Phillips, 2018). This journey tracks a patient's experiences, particularly during transitions of care (Beleffi et al., 2021), considering emotional, physical, and task-oriented aspects across multiple touchpoints (McCarthy et al., 2016). This dynamic approach offers a more comprehensive view of the patient experience (Saragosa et al., 2023).

Patient experience plays a crucial role in disease prevention and treatment, aiming to improve overall health (Ryan et al., 2014). Patient involvement in decision-making enhances care and boosts satisfaction (Birkeland et al., 2022), a key aspect of patient-centered care that empowers patients (Castro et al., 2016). Empowerment is defined as a process where patients understand their role, gain necessary knowledge, and engage in care within a culturally sensitive environment (WHO, 2009).

Given the connection between patient involvement, satisfaction, and empowerment (Tambuyzer & Van Audenhove, 2013), it is essential to engage patients throughout care stages. Engagement requires empowerment, motivation, and the ability to participate (Hickmann et al., 2022). This aligns with Higgins et al. (2017), who emphasize personalization, access, commitment, and therapeutic alliance, and Carman et al. (2013), who highlight the importance of collaboration among patients, families, advocates, and professionals. In prevention, patient characteristics, health conditions, healthcare professional knowledge, tasks, and settings significantly influence engagement (WHO, 2016). Effective communication, especially with patients of varying health literacy, is essential for all clinicians (Krist et al., 2017; Mazor et al., 2016). Enhancing health literacy through supportive environments and patient education promotes autonomy and patient-centered care (Barello et al., 2020). It is crucial to foster environments that prioritize patient-centered care, encourage proactive communication, and promote autonomy (Barello et al., 2020), and to develop strategies that cultivate a culture of two-way communication about health promotion and prevention (Luecking et al., 2020).

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Health communication

Health communication is critical in public health, as the rapid dissemination of information is essential for conveying important messages to a broad audience (Ceretti et al., 2022). Traditional communication strategies often targeted undifferentiated audiences, limiting their effectiveness. Recently, there has been a shift toward tailoring both the audience and message to improve intervention outcomes. For instance, younger patients' preference for digital tools such as patient portals, mobile health apps, and email communication suggests that online interventions for education and prevention could be particularly effective (Clarke et al., 2020; Lana et al., 2014).

To optimize these strategies, it is crucial to incorporate behavioral theories that explain why some approaches are more effective in engaging patients in preventive efforts. Self-Determination Theory (SDT) (Ryan & Deci, 2000) emphasizes the role of autonomy, competence, and relatedness in motivating individuals. Similarly, Social Cognitive Theory (SCT) (Bandura, 1986) highlights observational learning and self-efficacy as key factors shaping behavior. These theories offer valuable insights into how personalized communication strategies can enhance patient engagement in prevention (Bandura, 2004; Ng et al., 2012). Studies such as Ntoumanis et al. (2021) show that SDT-based interventions improve autonomy and motivation, while SCT emphasizes the mediating role of self-efficacy in behavior change, as demonstrated by Dishman et al. (2014).

Many studies also examine factors like message framing, risk perception, and social norms. For example, research shows that gain-framed messages are more effective in promoting preventive behaviors (Gallagher & Updegraff, 2012; Rothman et al., 2006). Effective communication often addresses perceived risks, as individuals who perceive higher risks are more likely to engage in protective behaviors (de Bruin & Bennett, 2020). Additionally, personalized risk assessments in patient-provider discussions tend to be more effective than generic communications (Edwards et al., 2000).

Social norms significantly influence health behavior. Perceived social expectations drive adherence to preventive behaviors, such as social distancing, and reinforcing positive norms encourages safer behaviors (Martínez et al., 2021; Holschneider & Alexander, 2003). For example, targeting prevention-oriented social norms has been effective in promoting safer behaviors among adolescents (Dixon et al., 2015). Similarly, social norms messaging in mental health can reduce stigma and foster help-seeking behaviors (Silk et al., 2017). Research on melanoma prevention shows that emphasizing injunctive norms-what people should do-along with descriptive norms-what others are doing-can enhance the effectiveness of interventions (Malher et al., 2008).

Effective campaigns require understanding the factors shaping individual decision-making. This includes analyzing existing communication dynamics, identifying barriers to change, and tailoring messages to address these challenges (Snyder, 2007). Health literacy-the ability to obtain, process, and understand health-related information-is particularly important in primary prevention (Berkman et al., 2010). Family communication also plays a key role in engaging individuals in prevention, particularly in the context of hereditary diseases like melanoma (Wu et al., 2023). Open parent-child communication can guide children toward desired behaviors (Gaber et al., 2013).

Furthermore, empowering individuals as active contributors to the creation of preventive messages fosters greater engagement. Schillinger et al. (2017) highlight how involving young people in preventive behaviors by stimulating creativity and influencing peer behavior can be effective. Trust is fundamental in this context, as health prevention relies not only on the accurate dissemination of information but also on the credibility and authenticity of the messengers. When individuals, particularly young people, are involved in creating and sharing prevention messages, it enhances relatability and the impact of the communication, fostering a culture of collective responsibility in health prevention (Zhu et al., 2018).

Purpose of the paper. *This paper aims to explore the role of prevention within the patient journey, focusing on the effectiveness of different engagement strategies in promoting preventive behaviors. Given the multidimensional nature of patient engagement, this study seeks to understand how and why certain strategies succeed or fail in fostering active participation in prevention efforts. Specifically, it examines which health communication strategies are most effective in engaging patients in prevention initiatives and how individual factors - such as health literacy, motivation, and risk perception - influence patients' willingness and ability to adopt preventive behaviors.*

To achieve these goals, this work-in-progress study will employ a multi-method approach, using both focus groups to explore differences in perceptions, motivations, and obstacles to engagement and experimental designs. In doing so, the study seeks to generate actionable insights for healthcare professionals, policymakers, and communication strategists, offering evidence-based recommendations on how to leverage communication strategies to maximize patient engagement in prevention. Ultimately, this research aspires to support the design of more effective, personalized, and culturally sensitive health interventions that empower individuals and foster proactive health management.

The discussion thus far can be summarized in three primary research questions:

RQ1. Which health communication strategies are most effective in promoting patient engagement in prevention?

RQ2. How do individual factors and social factors affect patient participation in preventive activities?

RQ3. What are the main barriers to patient engagement in prevention, and how can communication strategies overcome them?

Methodology. *This study employs a mixed-method design (Davis et al., 2011), incorporating a focus group (Study 1) to inform two subsequent experimental studies (Studies 2 and 3). The primary objective of Study 1 is to explore the most effective health communication strategies for fostering patient engagement in preventive behaviors. Given the contradictory and limited findings in the existing literature regarding the communicative elements that best promote*

preventive engagement, we adopt an inductive qualitative approach, utilizing the focus group method as an effective tool for exploratory data collection (Calder, 1977; Fern & Fern, 2001). The focus group setting allows for the observation of group interactions, a fundamental advantage of this method, as it facilitates the emergence of diverse perspectives compared to individual interviews (Krueger, 2014).

Following the methodological recommendations of Fern and Fern (2001), a structured discussion will be guided by a trained moderator using a standardized protocol developed in collaboration with the research team. A purposive sampling strategy based on referrals will be employed to recruit 10 to 15 participants. The session will last approximately two hours, beginning with an exploration of participants' willingness to engage in preventive health behaviors, followed by an in-depth discussion of the key communicative factors that either facilitate or hinder such engagement. Prior to the discussion, the moderator will provide participants with a detailed explanation of the session's objectives and procedures.

An interpretive methodological approach will be used to analyze the qualitative data, following Yin's (2013) three-stage analytic framework: (1) transcription analysis, (2) identification of recurring themes, and (3) synthesis of shared themes. To ensure the reliability of the coding process, two independent researchers will analyze the transcripts, with their findings subsequently compared to establish interrater reliability (Weber, 1990). Cohen's kappa coefficient (0.83) will be calculated to quantify the level of agreement between coders (Cohen, 1960). A thematic analysis will be conducted, with emergent themes systematically categorized to provide meaningful insights into the role of health communication in promoting preventive behaviors.

Results of Study 1 will then guide two subsequent experimental studies which will be designed to test what health communication strategies are most effective by also investigating possible boundary conditions (e.g., health literacy, motivation, and risk perception) and underlying mechanisms (e.g., perceived inefficacy of preventive measures).

Research limitations. *This work-in-progress research is not without limitations. The exploratory nature of this study does not allow for the generalizability of the expected results. For instance, the validity and reliability of the data collected could be influenced by the number and characteristics of individuals participating in the focus group. To mitigate this limitation, careful selection of participants and the facilitation of the focus group by expert researchers will be employed to enhance methodological rigor.*

Managerial implications. *From a managerial standpoint, this study aims to provide healthcare professionals, policymakers, and communication strategists with recommendations for optimizing communication strategies to enhance patient engagement in preventive care. By generating actionable insights, the research seeks to inform the development of more effective, personalized, and culturally responsive health interventions. Ultimately, this study aspires to contribute to the design of strategies that empower individuals, foster proactive health management, and improve public health outcomes*

Originality of the paper. *The originality of this study lies in reconciling previous conflicting findings on the effectiveness of health communication strategies in promoting preventive health behaviors. By investigating the communication factors that influence the success or failure of various approaches in promoting active participation in prevention efforts and addressing how individual factors-such as health literacy, motivation, and risk perception shape individuals' willingness and ability to adopt preventive behaviors, this research sheds light on how to maximize patient engagement in prevention.*

Key words: *health marketing; customer journey in healthcare; health communication strategies; preventive health behaviors.*

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AI and sustainability: Preliminary insights from a bibliometric analysis*

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Abstract

Artificial Intelligence (AI) is causing terrific effects on business ecosystems and human activities in general. This paper investigates the use of AI in two linked areas: production processes and consumer behavior. The paper reports the main results of a bibliometric analysis on the state of the art on the role of AI in these two fields. Regarding production processes, the goal was to analyze the current state of research on how AI can contribute to improving efficiency and reducing environmental impact. As for consumption, the analysis examined the relationship between AI-powered tools and their influence on consumer behavior. The bibliometric analysis let us identify relevant gaps in how these AI-based tools can guide consumers toward more eco-friendly choices and behaviors.

Framing of the research. *AI is emerging as a driver that improves global sustainability by supporting policy makers and companies in reducing environmental issues (Chan & Huang, 2003). Indeed, researchers and companies worldwide are recognizing the potential role of AI in improving production processes, reducing environmental impact, and guiding consumers toward more environmentally friendly choices (Haenlein et al., 2022). Moreover, this paper discusses the employment of AI in fighting against environmental challenges, referring to two strategic areas: production processes and consumer behavior. Sustainable production is defined as the production of goods or services using a set of methods that simultaneously address economic, environmental, and social issues, with the goal of reducing negative impacts through responsible and conscious activities (Garretson et al, 2016). On the other hand, sustainable consumption is defined as "actions that result in decreases in adverse environ mental impacts as well as decreased utilization of natural resources across the lifecycle of the product, behavior, or service" (White et al., 2019, p.23). AI is commonly defined as the use of computational machines capable of emulating human functions, such as prediction, learning, or generating content (Huang and Rust, 2021).*

The introduction of AI in production processes has received growing attention about its ability to optimize production processes, reduce environmental impact, reduce costs, and improve quality by analyzing large data sets and automating complex processes. According to this, Industry 4.0 represents an approach that shifts production processes from a traditional model, where machines dominate the production process, to a digital system process in which machines are automated (Oztemel and Gursev, 2020). The advent of Industry 4.0 has transformed modern manufacturing (Oztemel and Gursev, 2020), transforming companies into "digital ecosystems" in which technology promotes connection and collaboration between different parts of the production system (Kang et al., 2016). This revolution is led by digitalization and automation and, in such a scenario, AI is only one of the central elements of Industry 4.0, which includes a lot of complementary technologies such as Internet of Things (IoT) (Nižetić et al., 2020), robotics (Szilágyi et al., 2023) and big data analytics (Kumar et al., 2021), all working together to optimize efficiency in production processes.

On the other hand, AI plays a central role in shaping consumer behavior. It could enhance consumers' experience and influence their behavior, through tools such as wearable devices (Nahavandi et al., 2022), virtual assistants (Hoy, 2018; Pérez-Soler et al., 2021), or personalized recommendation systems (Yeomans et al., 2019). However, while promoting sustainable consumption is fundamental, academic literature on the use of AI to encourage consumers toward environmentally friendly choices is still limited. To date, academic studies have focused on individual responsibility by investigating barriers and drivers from a psychological point of view (see White et al., 2019 for a review), thus neglecting investigating how AI could promote more environmentally sustainable behaviors, both at an individual level and in relation to systems and infrastructures (Chater & Loewenstein, 2023).

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Purpose of the paper. *The academic literature highlights a relevant interest in Industry 4.0 with a focus on the integration of AI technologies and the digitization of the value chain. The integration of Industry 4.0 allows the creation of connected ecosystems able to optimize business operations and to improve sustainability in production processes (Kang et al., 2016). Industry 4.0 is based on the use of data and advanced devices to automate processes, improve efficiency, and reduce environmental impact throughout the entire value chain (De Man and Strandhagen, 2017; Stock and Seliger, 2016). At the same time, the power of AI is not only linked to production processes. It is becoming an important tool that influences consumer behavior. While academic literature has given considerable attention to industrial optimization and business strategies, the use of AI to guide consumers toward environmentally friendly consumption choices remains underexplored. This is particularly significant when considering the opportunities offered by easily accessible AI tools, such as vocal assistants (Hoy, 2018), personalized recommendation systems (Yeomans et al., 2019), and virtual influencers (Lee and Yuan, 2023), which could help guide consumers toward more informed and sustainable decisions (Puntoni et al., 2021).*

Given the aim of analyzing these two contexts, production processes and consumer behavior, the main objective of this research is to map the existing literature in both fields to highlight central trends, areas of application, and future research opportunities. Additionally, while an expanding interest in research has begun to examine the use of AI in different contexts, such as production processes (Belhadi et al., 2024; Neri et al., 2023) and consumer behavior (Hollebeek et al., 2024; Jain at al., 2024), there is a lack of research on the link between AI, consumer behavior, and sustainability, particularly regarding the direct relationship between AI-powered tools and consumers' engagement in pro-environmental behaviors. To achieve this aim, we conducted a bibliometric analysis on the use of AI for sustainability in production processes and consumers' behaviors to identify the main trends and areas of application of AI and the current state of research in the aforementioned areas.

Methodology. *To analyze the literature on the use of AI in production processes and consumer behavior, we conducted a bibliometric analysis (De Man and Strandhagen, 2017; Maio et al., 2023; Stock and Seliger, 2016). This analysis allows for overcoming the biases related to the sample selection process that often characterize traditional systematic reviews (Cosma and Rimo, 2024) and provides both quantitative and qualitative results. It enables the identification of knowledge clusters in a specific research area and offers a comprehensive overview of an entire field of study (Mukherjee et al., 2022).*

The bibliographic data used for this analysis were extracted from the Scopus database (Öztürk et al., 2024). For the production processes perspective, the search focused on scientific studies containing the following keywords: "circular economy," "artificial intelligence," "industry 4.0," "sustainability," "smart manufacturing," "sustainable production," "industry 5.0," "green product," "green," "smart manufacturing." These terms were searched within the title, abstract, and keywords of the studies. For the consumer behavior perspective, the following keywords were used: "artificial intelligence," "sustainable consumption," "green consumption," "green purchase," "sustainable purchase," "green choice," and "sustainable choice."

The initial phase of the search produced a preliminary sample of 4,222 and 2,189 studies for the two perspectives, respectively. Afterward, a filtering process was carried out to include only studies published in English and exclude irrelevant articles based on their abstracts. To further refine the search criteria and obtain relevant documents, we referred to journals included in the Academic Journal Guide (AJG) published by CABS (Cheng et al., 2023). This phase resulted in a final sample of 207 documents for production processes and 401 for consumer behavior, published between 2018 and 2025. We used VosViewer software (Van Eck and Waltman, 2010) and the Bibliometrix package in R (Aria and Cuccurullo, 2017) to analyze the data. These tools allow conducting author performance analysis and content analysis for both perspectives. Our bibliometric analysis on production processes identified clusters related to advanced technologies, digitalization, and operational sustainability. Regarding consumer behavior, the analysis highlighted thematic clusters linked to emerging technologies, personalized marketing strategies, and ethical issues, but revealed a significantly lower number of studies.

Network Analysis *VOSviewer 1.6.18 was used to conduct the network analysis presented in this study as mapping techniques. The software visually represents the keywords from the analyzed articles, based on co-occurrence data (Van Eck et al., 2010). These maps identify knowledge clusters within a broad research field, providing a structured overview of emerging topics in both domains: AI in production processes and AI in consumer behavior.*

AI in Production processes. *To analyze the literature on the integration of AI and advanced technologies in production processes, a co-occurrence analysis of keywords used by authors was conducted. This approach assumes that the joint appearance of two keywords in documents indicates a connection between the concepts they represent (Donthu et al., 2021). VOSviewer allowed the identification of key concepts through a text-mining algorithm: each keyword is represented by a circle, the size of which is proportional to the frequency of the word in the analyzed documents. The distance between the keywords indicates their correlation, while colors define distinct clusters (Laudano et al., 2018). The co-occurrence analysis identified three main clusters, each represented by a different color in the map that shows the strongest connections through multiple lines (Figure 1). These clusters highlight key areas of focus within AI in production processes domain.*

Fig. 1: Network diagram of the co-occurrence of keywords - AI in production processes

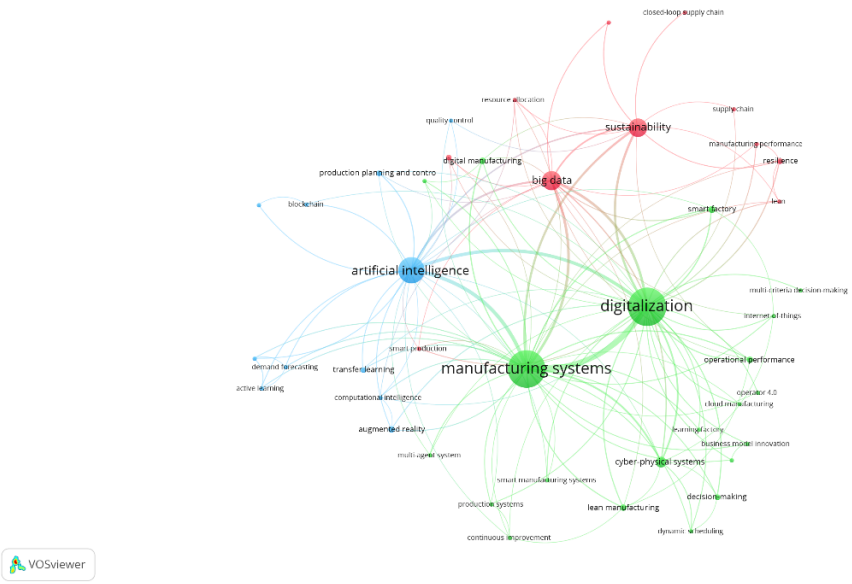

Figure 2 (below) shows the keywords with their respective occurrence number (OC) and Link Strength (LS) for each cluster. The identified clusters are as follows:

- *Cluster 1 (Green): Includes keywords such as digitalization (125 OC, 209 LS), manufacturing systems (123 OC, 214 LS), and cyber-physical systems (10 OC, 27 LS). This cluster highlights the crucial role of digital integration in advanced manufacturing processes.*
- *Cluster 2 (Blue): Contains keywords related to transformative technologies like artificial intelligence (59 OC, 110 LS), augmented reality (10 OC, 17 LS), and blockchain (4 OC, 10 LS). This cluster reflects the focus on technological innovations aimed at revolutionizing the manufacturing sector.*
- *Cluster 3 (Red): Gathers keywords related to sustainability and business performance, including sustainability (30 OC, 51 LS), big data (31 OC, 72 LS), and resilience (6 OC, 10 LS). It indicates a strong connection between innovation and environmental goals.*

OC= Occurrences LS= Link Strength

Fig. 2: Analysis of keywords - AI in production processes

Cluster 1 (Green): Digital Integration in Manufacturing			Cluster 2 (Blue): Artificial Intelligence and Transformative Technologies			Cluster 3 (Red): Sustainability and Resilience		
Keywords	OC	LS	Keywords	OC	LS	Keywords	OC	LS
digitalization	125	209	artificial intelligence	59	110	big data	31	72
manufacturing systems	123	214	augmented reality	4	7	closed-loop supply chain	2	2
cyber-physical systems	10	27	production planning and control	3	6	lean	2	5
smart factory	5	11	transfer learning	3	5	manufacturing performance	2	4
digital manufacturing	4	9	active learning	2	7	resilience	3	8
lean manufacturing	4	10	blockchain	2	4	resource allocation	2	5
operational performance	4	9	computational intelligence	2	6	semiconductor industry	2	4
decision-making	3	7	demand forecasting	2	6	smart manufacturing system	3	4
business model innovation	2	5	original equipment manufacturer	2	3	smart production	2	5
cloud manufacturing	2	3	quality control	2	3	supply chain	2	2
continuous improvement	2	5	quality inspection	2	7	sustainability	30	51
dynamic scheduling	2	7						
fourth industrial revolution	2	5						
industrie 4.0	2	5						
internet-of-things	2	7						
learning factory	2	4						
multi-agent system	2	4						
multi-criteria decision-making	2	2						
operator 4.0	2	3						
production systems	2	6						
smart manufacturing systems	2	4						

AI and consumer behavior

The co-occurrence of keywords related to the use of AI to influence consumer behavior was also analyzed. The analysis revealed the presence of distinct clusters that outline the main research areas. The co-occurrence analysis

identified three main clusters, each represented by a different color on the map, showing the strongest connections through multiple lines (Figure 3).

Fig. 3: Network diagram of the co-occurrence of keywords - AI and consumer behavior

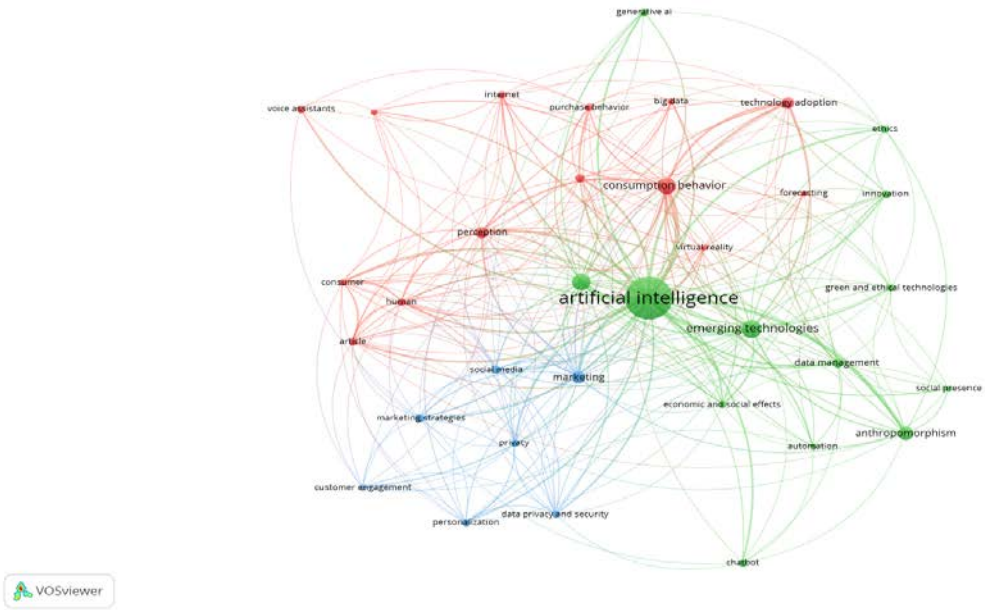

Figure 4 (below) shows the keywords along with their number of occurrences (OC) and Link Strength (LS) for each cluster. The identified clusters are as follows:

- *Cluster 1 (Green): Includes keywords such as artificial intelligence (305 OC, 439 LS), automation (70 OC, 108 LS), and generative AI (54 OC, 113 LS). This cluster focuses on technological applications and the evolution of AI, with an emphasis on emerging technologies, ethics, and sustainability. A strong connection is observed between innovation, green technologies, data management, and automation. Anthropomorphism indicates interest in personalizing human-machine interactions, such as chatbots mimicking human-like features.*
- *Cluster 2 (Red): Contains keywords related to consumer behavior and decision-making, including consumer behavior (46 OC, 131 LS), purchase behavior (9 OC, 21 LS), and technology adoption (21 OC, 63 LS). It indicates a strong link between artificial intelligence and consumer decision-making processes, highlighting AI's role in influencing purchase behavior and value perception.*
- *Cluster 3 (Blue): Includes keywords related to marketing strategies, such as marketing strategies (46 OC, 146 LS), personalization (16 OC, 72 LS), and social media (12 OC, 41 LS). This cluster reflects the focus on using AI to enhance consumer engagement and personalize user experiences. Privacy emerges as a critical theme, indicating consumer concerns regarding data management.*

OC= Occurrences LS= Link Strength

Fig. 4: Analysis of keywords - AI and consumer behavior

Cluster 1 (Green): Artificial Intelligence and Emerging Technologies			Cluster 3 (Red): Consumer Behavior and Decision-Making			Cluster 2 (Blue): Marketing Strategies		
Keywords	OC	LS	Keywords	OC	LS	Keywords	OC	LS
artificial intelligence	305	439	consumption behavior	46	146	marketing	26	75
emerging technologies	54	119	perception	21	81	marketing strategies	12	35
consumer behavior	46	131	technology adoption	21	63	social media	12	41
anthropomorphism	33	57	decision making	13	35	personalization	10	28
data management	14	37	article	10	55	privacy	10	29
generative ai	11	21	human	10	55	data privacy and security	9	32
innovation	11	27	voice assistants	10	14	customer engagement	7	18
chatbot	10	18	big data	9	22			
ethics	10	24	consumer	9	50			
economic and social effects	9	31	internet	8	33			
green and ethical technologies	8	23	purchase behavior	8	30			
automation	7	20	forecasting	7	16			
social presence	7	15	purchase intention	7	19			
			virtual reality	7	31			

AI in production processes: Results.

Digitalization and Manufacturing Systems (Green Cluster). *In recent years, digitalization has been a fundamental transformative force in production systems, leading to a revolution in business practices. Digitalization manifests through advanced technologies such as cyber-physical systems and smart factories, which are redefining production processes by integrating digital tools into the management and control of operations (Xu and Zweifel, 2020). The strong connection to the concept of advanced manufacturing systems is demonstrated by the frequent co-occurrence with terms such as "lean manufacturing" and "decision-making" (Najaf et al., 2020). Innovation in business models, supported by technologies like the Internet of Things (IoT) and cloud manufacturing, has facilitated the spread of collaborative processes, improved operational efficiency and stimulated continuous improvement (Rawat et al., 2021). This cluster highlights how digitalization is becoming the cornerstone of Industry 4.0, creating a highly integrated and dynamic ecosystem.*

AI and Advanced Technologies (Blue Cluster). *Advanced technological innovations represent another crucial area of research, with a particular focus on AI and augmented reality (AR) (Gimpel et al., 2018). These transformative technologies are influencing key aspects of production, including operations planning and control, knowledge transfer, and quality inspection (Gupta et al., 2022). For example, AI is finding applications in domains such as demand forecasting and computational intelligence, improving prediction and adaptation to market dynamics. Emerging technologies, such as blockchain and active learning, are helping to create more resilient and adaptive production systems, promoting the transition to digitalized operational models (Zarifis et al., 2021). The convergence of these technologies highlights significant potential for addressing critical challenges in production systems, such as reducing cycle times and optimizing resource use.*

Sustainability and Corporate Performance (Red Cluster). *Sustainability has emerged as a central element in corporate strategies, linking environmental goals with improvements in organizational performance. Keywords associated with this cluster, such as "resilience," which refers to the ability of supply chains to recover from disruptions while maintaining operations (Ribeiro and Barbosa, 2018), and "lean manufacturing," a method for minimizing waste without sacrificing productivity (Ruiz-Benitez et al., 2019), highlight the importance of strategies for resource efficiency and adaptability. Additionally, the concept of "closed-loop supply chain," which combines forward and reverse logistics to recover value from returned products (Mehrjerdi and Shafiee, 2019), emphasizes commitment to the circular economy by reducing waste and optimizing material usage. Sustainability is also closely linked to digital and advanced technologies, as suggested by the growing role of big data and its application in monitoring and optimizing business operations (Aitken, 2022). This cluster emphasizes the importance of integrating sustainable practices into production systems to balance economic and environmental objectives.*

AI and consumer behavior: Results.

Artificial Intelligence and Emerging Technologies (Green Cluster). *In recent years, AI has become central to technological innovation, leading to significant developments in automation and emerging technologies. The focus on ethics and sustainability points to the necessity of developing AI solutions that are not only practical but also capable of persuading users to take socially and environmentally conscious actions. This perspective ties into the broader debate on corporate social responsibility, where the adoption of sustainable AI technologies can contribute to more ethical and inclusive business models (Riva et al., 2022). Generative AI, which Feuerriegel (2024) defines as computational techniques that can generate seemingly original, meaningful content—like writing, images, or audio—from training data, is a key component of this cluster. It is revolutionizing how businesses engage with customers and streamline production processes. Furthermore, the concept of social presence related to AI technologies suggests that the perception of human-machine interaction is a central factor for their acceptance and widespread adoption (Pérez-Soler et al., 2021).*

Consumer Behavior and Decision-Making (Red Cluster). *AI is transforming consumer behavior and their decision-making process, particularly focusing on the influence of voice assistants and digital technologies on purchasing habits. The adoption of tools such as Alexa and Google Assistant is redefining how consumers search for information, make purchases, and interact with brands (Sharma et al., 2024). Additionally, the increasing use of chatbots and conversational interfaces in e-commerce highlights AI's potential to enhance customer experience by offering more personalized and immediate interactions (Sidlauskiene et al., 2023). However, questions remain about the relationship between AI and decision-making processes, particularly regarding how increasing automation may reduce consumer autonomy and influence choices in ways that are not always transparent (Hollebeek et al., 2024). An emerging aspect in this cluster is the role of the internet and advanced connectivity technologies in amplifying AI's influence on consumption decisions, creating new opportunities for marketing and digital engagement.*

Marketing Strategies (Blue Cluster). *Companies are increasingly investing in AI to improve marketing strategies, with a particular focus on personalization and customer engagement. The use of advanced AI systems allows companies to analyze vast amounts of data to create tailored experiences, boosting the effectiveness of advertising campaigns and consumer loyalty (Lee et al., 2022). However, the growing attention to personalization raises concerns related to privacy and the protection of personal data, especially in an increasingly stringent regulatory environment (Sands et al., 2022). The main challenge for companies is finding a balance between optimizing AI-based marketing strategies and adhering to data security regulations, ensuring that consumers have transparency and control over their information (Arsenyan et*

al., 2021). The adoption of ethical and regulated AI practices will be crucial in maintaining consumer trust and promoting responsible use of digital marketing technologies.

Research limitations. *The present research offers preliminary insights from bibliometric analysis and, as such, presents some limitations that pave the way for future research. First, other statistical analysis typical of the bibliometric methodology could expand our understanding of the state of knowledge in the two examined areas. Second, this research indicates potential avenues for future studies but say little on how AI could effectively contribute environmentally sustainable product processes and consumption behaviors.*

Managerial implications. *AI can serve as a strategic tool to promote sustainability in both domains. In the industrial context, AI-based systems can be used to monitor the environmental impact of production and encourage more sustainable practices, enabling real-time adjustments to reduce resource consumption. In this way, policymakers can foster new models based on continuous improvement in sustainable practices. In consumption context, AI can support targeted public policies, such as using predictive algorithms to raise awareness about more environmentally friendly consumption behaviors or deploying intelligent systems to regulate transparency in the use of data. Moreover, AI can provide important information to policymakers, by analyzing a large amount of insight into consumer habits. For companies, the opportunities vary depending on the sector of application. In the manufacturing sector, the adoption of AI-driven technologies can improve operational efficiency and reduce waste, contributing to a more sustainable supply chain. In the context of consumer behavior, AI allows the design of innovative tools that not only personalize the shopping experience but also guide consumers toward more sustainable choices.*

Originality of the paper. *This study makes several contributions. First, it deepens the understanding about the role of AI in production processes, particularly in the context of Industry 4.0, by demonstrating the way in which AI can improve not only data management, operational efficiency and reduce waste, contributing to a more sustainable supply chain, but also challenging the existing theories about companies' capabilities and management of resources. According to this perspective, this study provides new visions on how companies can develop and sustain competitive advantage in this digitalized environment. Second, this study deepens the understanding of the role of AI and consumer behavior. Specifically, this study contributes to academic literature by investigating the capability of AI in shaping consumer decision-making process. While current models highlight the role of rationality and other psychological drivers like social influence, habits formation, individual self, feelings and cognition, tangibility (White et al., 2019) in shaping sustainable consumption behaviors, this study contributes to the literature on the current state of research by highlighting the missing link between three areas of current academic literature: AI, consumer behavior and sustainability.*
Although the growing body of work has begun to examine the role of AI in specific sectors like Industry 4.0, human-machine interaction in smart manufacturing (Kang et al., 2016; Kusiak, 2018), or how avatars, chatbots, and other AI-powered tools shape consumer behavior (Bonezzi et al., 2022; Cadario et al., 2021; Longoni et al. 2019; Longoni and Cian 2022; Puntoni et al. 2021), this bibliometric analysis contributes to literature by confirming that Industry 4.0 continues to successfully integrate AI to create more efficient and sustainable production systems, enabling companies to optimize resource use, reduce costs, and lower environmental impact. However, a clear gap in research has emerged regarding the direct interaction between AI and consumers in the context of sustainability.

Key words: *artificial intelligence; sustainability; bibliometric analysis; consumer behavior; network analysis*

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All That Glitters Is Not Gold, but Words: Transparency and Uniqueness in Luxury Brand Building Through Storytelling

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Abstract

The luxury sector is undergoing a profound transformation driven by a combination of unsatisfactory performance results and shifting consumer attitudes. Among other factors, a prominent role is played by the growing interest among stakeholders in how luxury companies address various facets of sustainability - a core element in shaping branding strategies to remain competitive within the sector. However, limited attention has been devoted to the practical implications of sustainability in the luxury domain, underestimating the strategic opportunities it offers. Accordingly, our research aims to examine how transparency regarding sustainable operations influences the perceived uniqueness of products, fostering positive consumer attitudes and improving brand reputation, purchase intention, and word-of-mouth. Furthermore, the study explores whether different communication styles (Narrative storytelling vs. Informative) enhance these effects. The findings suggest that providing transparency about a company's sustainable practices significantly increases the perceived value of its products and positively impacts brand outcomes. This effect is further amplified by narrative communication, which more effectively fosters favorable brand-related outcomes compared to purely informational approaches.

Key words: *Sustainability; Luxury; Transparency; Storytelling; Uniqueness; Brand Attitude*

Introduction. *The luxury goods industry is currently under extreme pressure, resulting in several brands experiencing declining economic and reputational performance. While anecdotal evidence suggests the presence of a shift in consumers' attitudes - with young shoppers attributing less value to traditional luxury code (Klasa & Indvik, 2025), and older ones affected by fatigue and trivialisation (Carbone, 2024) - multiple other factors are also gaining relevance in shaping consumer decisions. One of such factors is sustainability, which has become a key expectation among increasingly conscientious consumers (Kapferer & Michaut, 2015). In this context, transparency emerges as a potentially strategic signal (Spence, 1973) to communicate trustworthiness and sustainability commitment to consumers, expecially when traditional makers of luxury are under question.*

Traditionally associated in the literature with exclusivity (Dubois & Paternault, 1995), quality, and prestige (Colucci, Tuan & Visentin, 2020), luxury now faces the challenge of reconciling its hedonistic nature with ethical and environmental principles (Achabou & Dekhili, 2013; Janssen et al., 2017).

Previous research indicates that consumer reactions to sustainability-oriented luxury goods - whether sustainability is an intrinsic product attribute (Janssen et al., 2017; Kapferer & Michaut-Denizeau, 2019) or the result of communication strategies (Amatulli, De Angelis & Donato, 2021) - are mixed. Some studies suggest that sustainability may negatively affect luxury brand perception, to the extent of hindering commercial performance (Davies, Ahonkhai & Lee, 2012; Kapferer & Michaut, 2013), as luxury and sustainability are often perceived as contradictory. Conversely, other findings view luxury and sustainability as compatible, with the integration of sustainable practices enhancing brand performance (Janssen et al., 2017). While earlier research emphasized consumer skepticism, more recent studies suggest a progressive convergence between luxury and sustainability. Nevertheless, despite luxury firms expressing interest in integrating sustainability into their business strategies (Broccardo et al., 2022), reluctance persists - not only in implementing concrete actions but also in disclosing information about corporate sustainability efforts (Fashion Revolution, 2023).

In this context, transparency in sustainable practices plays a central role, as it reflects the ability of companies to communicate information clearly and accessibly about their production practices and the values they endorse (Yoo &

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Jeong, 2014). Despite being under-investigated in luxury, transparency fosters authentic consumer-brand relationships, strengthens trust, and enhances brand reputation (Orij, 2010; Lin et al., 2017; Kang & Hustvedt, 2014).

On one hand, transparency in luxury branding can serve as a differentiating factor, reinforcing perceptions of uniqueness and authenticity (Kapferer & Michaut, 2015). On the other, it must be carefully balanced to preserve the aura of exclusivity and desirability that defines luxury goods. Recent literature highlights that narrative communication strategies, such as storytelling, can play a pivotal role in enhancing the effectiveness of transparency by transforming technical information into emotionally engaging and accessible messages (Kang et al., 2020; Giorgino & Mazzù, 2024). Through authentic and credible narratives, brands can articulate their values, foster emotional connections with consumers, and promote positive brand attitudes (Lundqvist et al., 2013; Dwivedi et al., 2018).

Despite the growing academic interest in the intersection of luxury and sustainability, little is known about how transparency regarding sustainable practices influences the perception of uniqueness in a luxury product and, in turn, how this perception influences key brand-related outcomes, such as reputation, purchase intention, and word-of-mouth. Furthermore, the moderating role of communication style - particularly the contrast between narrative versus purely informational messaging - remains underexplored, despite its practical implications.

This study aims to address these gaps through an experimental investigation into the impact of transparency within sustainable luxury branding.

Framing of the research and purpose of the paper

Sustainability and Luxury

Despite numerous attempts to establish a unified definition of the concept of luxury (Fionda & Moore, 2009), research as not yet reached a consensus on its precise meaning (Janssen et al., 2017). Luxury is often associated with the cultivation of appearance, pronounced hedonism, and the fulfillment of primarily symbolic needs (Atkinson & Kang, 2021; Kapferer, 1998) and, in recent years, with the increasing demand for ethical and sustainable standards (Kapferer & Bastien, 2009). While luxury brands have responded by systematically incorporating sustainable practices into their priorities (Sipilä et al., 2020), ambiguity persists regarding the precise meaning of sustainability in this context (Athwal et al., 2019). This contradiction, known as the luxury paradox (Wong & Dhanesh, 2017), underscores a key challenge: the impact of transparency on consumer perceptions (Mohr, Webb & Harris, 2001).

Lin et al. (2017) clarified the role of transparency in shaping consumers' green perceived value and self-brand connection, ultimately reinforcing consumer trust. Transparency, when leveraged to disclose relevant corporate information (Yang & Battocchio, 2020), can enhance brand reputation (Albu & Flyverbom, 2016) by fostering trust and authenticity (Yoo & Jeong, 2014; Orij, 2010). This is in line with the findings of Shuv-Ami (2020), who developed a scale to measure emotional brand attachment, showing how trust, honesty, and transparency contribute to the formation of "brand lovemarks" in consumers' minds. However, it also poses a potential risk to the aura of exclusivity that defines luxury goods (Kapferer & Michaut-Denizeau, 2019). Literature suggests that when applied strategically, transparency can enhance product differentiation, leading to more favorable consumer attitudes toward the brand (Mohan et al., 2020).

Recent studies interpret transparency through the lens of Signaling Theory (Spence, 1973; 2002), which posits that companies reduce information asymmetry by sending credible signals to the market. In the luxury context, transparency acts as a costly signal of authenticity and ethical commitment, enhancing trust and differentiation (Friske, Hoelscher & Nikolov, 2023). Moreover, Sansome, Wilkie & Conduit (2024) define brand transparency as comprising three core components: clarity, objectivity, and proactivity, which together shape consumers' perceptions and responses to sustainability communication.

Prior research has primarily focused on the mass fashion industry, categorizing transparency into the two dimensions of price transparency and production transparency (Yang & Battocchio, 2020; Mohan, Buell & John, 2020). Price transparency refers to the disclosure of unit costs incurred throughout the production process (Mittal & Agrawal, 2016), while production transparency pertains to the disclosure of manufacturing and supply chain details (Egels-Zandén, Hulthén & Wulff, 2015). Within the Italian context, Gatti, Gabrielli & Bonetti (2022) show how specific product features in luxury - such as craftsmanship and origin - can reinforce perceived authenticity and symbolic value. These features may interact with transparency in shaping brand perception.

Based on the above, this study hypothesizes that providing consumers with transparent information on corporate operations can positively influence brand reputation, purchase intention, and word-of-mouth. Formally:

H1a: *The presence of transparency regarding the production process of a luxury good exerts a more favorable influence on the brand's reputation in the eyes of consumers compared to its absence.*

H1b: *The presence of transparency regarding the production process of a luxury good exerts a more favorable influence on consumers' purchase intention toward the brand's products compared to its absence.*

H1c: *The presence of transparency regarding the production process of a luxury good exerts a more favorable influence on word of mouth about the brand compared to its absence.*

Luxury Consumers' Desire for Uniqueness

Previous research has highlighted a strong correlation between luxury consumers and their pursuit of uniqueness, as these individuals seek to maintain their distinctiveness (Kauppinen-Räisänen et al., 2018). Prior studies confirm that the need for uniqueness is driven by the desire to affirm social status through consumption, directly influencing purchasing

decisions (Chan, Berger & Van Boven, 2012). According to Kim et al. (2012), sustainable development represents an opportunity to enhance brand differentiation and strengthen corporate image. Given consumers' growing interest in sustainability (Mena et al., 2019), transparent communication has the potential to elevate the image of a luxury brand (Kapferer & Michaut, 2015). In the current context of luxury massification (Atkinson & Kang, 2021), transparency may serve as a strategic tool to rebuild trust and stimulate consumer curiosity. This aligns with the findings of Villani and Mattiacci (2021), who emphasized that sustainability-related product features significantly contribute to value perception and uniqueness in the new luxury landscape.

Amatulli et al. (2021) found that the atypicality, or deviation from what is considered common (Schnurr, 2017), of a message communicated by a luxury brand influences the willingness to buy, with a more pronounced impact on consumers who aspire strongly toward uniqueness. Moreover, the increase in perceived uniqueness through this communication strategy enhances purchase intention. Since atypicality - a strong differentiating element (Kim et al., 2012) - can increase purchase intention and the perception of transparency in production, we hypothesized that:

H2: *The presence of transparency in a luxury brand's production process positively impacts the perceived uniqueness of the brand compared to its absence.*

The need for uniqueness is also associated with self-expression, suggesting that consumers who highly value uniqueness tend to choose distinctive brands and adopt innovative products (Snyder, 1992). Luxury brands - often perceived as rare and exclusive - are used to satisfy this psychological drive (Tian, Bearden & Hunter, 2001). Furthermore, the literature suggests that when perceived uniqueness increases, it can influence not only purchase intention, but also how consumers evaluate brand reputation and their willingness to engage in word of mouth (Kapferer & Michaut, 2015; Phau & Prendergast, 2000). We therefore propose that perceived uniqueness mediates the relationship between production transparency and brand-related outcomes, as follows:

H3a: *The perception of uniqueness ~~positively~~ mediates the relationship between production transparency and brand reputation.*

H3b: *The perception of uniqueness ~~positively~~ mediates the relationship between production transparency and purchase intention.*

H3c: *The perception of uniqueness ~~positively~~ mediates the relationship between production transparency and word of mouth.*

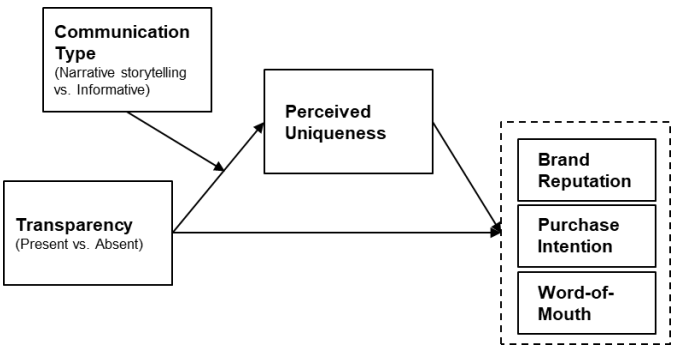
The Power of Storytelling

A high level of information dissemination is not always effective, as the message received by consumers requires *interpretation by the recipient. Numerous studies on storytelling have highlighted that this practice is now central to strategies for engaging consumers by evoking emotions (Kang et al., 2020). However, it is not enough to tell a story; it is essential that the story is truthful: companies must tell honest and credible stories to maintain their relevance (Dessart & Standaert, 2023). In this context, transparency applied to brand narratives appears to be a relevant element. Herskovitz and Crystal (2010) argue that a credible narrative can create a lasting emotional bond based on trust, strengthening a brand's power. The association with transparent practices, which in turn provide differentiation (Kim et al., 2012), could strengthen the distinction which, as hypothesized in this paper, would contribute to the brand's uniqueness (Dwivedi, Nayeem & Murshed, 2018). Considering these premises, it is hypothesized that communication style moderates the effect of transparency on perceived uniqueness. In particular, narrative communication is expected to enhance the positive effect of transparency compared to informative communication.*

H4: *Narrative communication (narrative storytelling), compared to a purely descriptive communication (informative), strengthens the positive effect of production transparency on perceived uniqueness.*

Figure 1 shows the integrated hypothesized model.

Figure 1: Hypothesized model



Methodology

Data collection and Sample

Data collection was conducted through an online questionnaire administered via the Qualtrics XM platform, in Italy, in August 2024. A total of 245 participants (Mage = 30.88; 48.6% Female) completed the survey in a consistent and valid manner, following a data cleaning process that led to the exclusion of 10 non-compliant responses. Participants were randomly assigned to one of four experimental conditions: transparency (present vs. absent) and communication type (narrative storytelling vs. informative).

Procedure and Pretest

A pre-test with 55 participants confirmed the successful perception of the manipulations with significant differences between the experimental conditions ($p < 0.001$). After verifying the reliability of the stimuli, the main study proceeded with a final causal between-subjects 2x2 research design. Participants were randomly exposed to one of the four experimental conditions, each presenting a visual scenario featuring a webpage related to a fictitious luxury brand product. The decision to avoid referencing real brands and to create a fictitious one specifically for the experiment was made to minimize potential cognitive biases.

After viewing the stimulus, participants completed a questionnaire divided into four sections, containing multiple-choice questions. Appendix 1 illustrates the stimuli viewed by the survey respondents.

Stimuli and Measurement Scales

The stimuli were designed to represent a sustainable luxury product, accompanied by textual and visual descriptions that manipulated transparency and communication style. Each question was evaluated using previously validated 7-point Likert scales (1 = strongly disagree, 7 = strongly agree). The mediation of perceived uniqueness was based on Homer's (2006) scale (e.g., "Dull / Exciting", "Unoriginal / Original", "Not Unique / Unique"). Brand reputation was measured using Hart and Phau's (2022) scale (e.g., "The brand is transparent", "The brand is honest", "The brand is reliable"). Purchase intention was based on the study by Dodds, Monroe, and Grewal (1991) (e.g., "Would buy the product", "Would consider buying the product", "Would like to buy the product"). Finally, word-of-mouth was based on Maxham and Netemeyer's (2002) study (e.g., "Spread a positive Word of Mouth", "Would recommend the product", "Would mention the product").

Results. *All measurement scales demonstrated satisfactory reliability, as the Cronbach's alpha values for each construct exceeded the recommended threshold for internal consistency. Specifically, the reliability values were as follows: perceived uniqueness ($\alpha = 0.947$, SE = 0.16), brand reputation ($\alpha = 0.979$, SE = 0.05), purchase intention ($\alpha = 0.972$, SE = 0.16), and word-of-mouth ($\alpha = 0.973$, SE = 0.04), thereby confirming the robustness of the measurements.*

To assess construct validity, an exploratory factor analysis was conducted using the principal component analysis method with Varimax rotation. The number of extracted factors was determined according to Kaiser's criterion (eigenvalue > 1) and a cumulative variance exceeding 60%. All items exhibited extraction values above 0.50 and factor loadings greater than 0.30, supporting the adequacy of the factorial structure.

Sampling adequacy was verified through the Kaiser-Meyer-Olkin (KMO) test, which indicated satisfactory levels for all scales (mediator: 0.768; first dependent variable: 0.781; second dependent variable: 0.785; third dependent variable: 0.776). Finally, Bartlett's test of sphericity yielded statistically significant results ($p < 0.001$) for all constructs, confirming the suitability of the factor analysis.

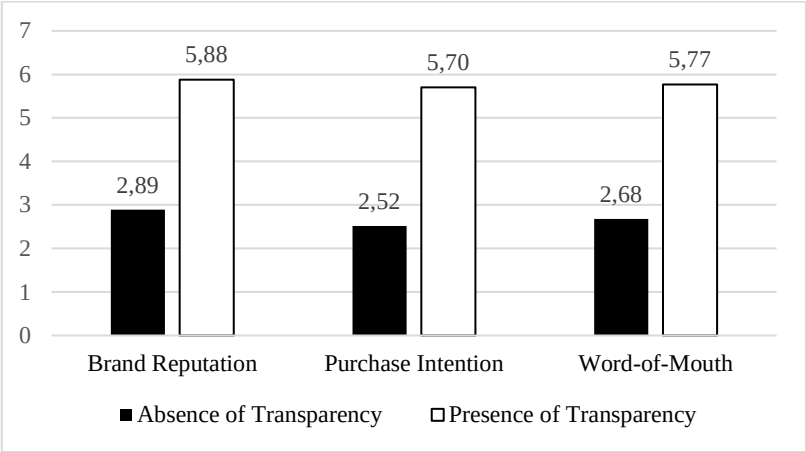
Direct Effects

To test hypothesis H1a, which posits that the presence of transparency (vs. absence) has a positive effect on luxury brand reputation, a one-way Analysis of Variance (ANOVA) was conducted. Assuming the conditions of 0 = absence of transparency and 1 = presence of transparency, the analysis revealed a significant difference between the two groups. Specifically, participants in the absence of transparency condition ($n = 122$) reported a mean score of $M = 2.89$, $SD = 1.51$, whereas those in the presence of transparency condition ($n = 123$) obtained a significantly higher mean score ($M = 5.88$, $SD = 1.12$). The one-way ANOVA results confirm a significant effect of transparency on brand reputation ($F(1,243) = 307.197$, $p < 0.001$), highlighting that the presence of transparency leads to a significant increase in the perception of brand reputation compared to the absence of transparency condition.

Hypothesis H1b posits that the presence of transparency (vs. absence) positively influences consumers' purchase intention. A one-way ANOVA indicated a significant difference ($F(1,243) = 332.080$, $p < 0.001$) between the groups in the absence of transparency condition ($n = 122$, $M = 2.52$, $SD = 1.35$) and those in the presence of transparency condition ($n = 123$, $M = 5.70$, $SD = 1.37$) on purchase intention.

Hypothesis H1c suggests that the presence of transparency (vs. absence) is associated with a greater propensity for word-of-mouth regarding a luxury brand. In this case as well, the one-way ANOVA revealed a significant difference ($F(1,243) = 308.737$, $p < 0.001$) between the two groups. Participants in the absence of transparency condition ($n = 122$) reported a mean score of $M = 2.68$, $SD = 1.44$, whereas those in the presence of transparency condition ($n = 123$) obtained a significantly higher mean score ($M = 5.77$, $SD = 1.30$).

Figure 2. Mean Scores of Direct Effects of Transparency



Mediation

To assess the statistical significance of the mediation hypotheses, three distinct regression analyses were conducted using Model 4 of the SPSS Process Macro (version 4.2), developed by Andrew F. Hayes. The objective was to test the mediating effect of perceived uniqueness in the relationship between the independent variable (transparency: present vs. absent) and the three dependent variables (brand reputation, purchase intention, and word-of-mouth).

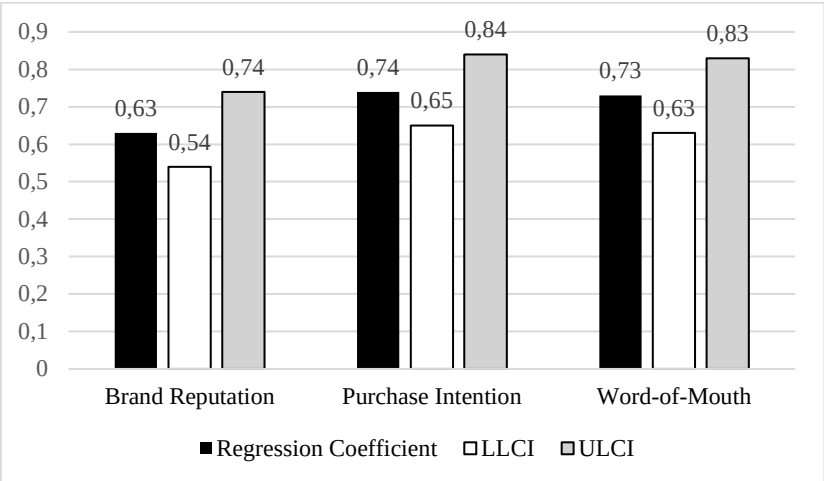
To determine statistical significance, a 95% confidence interval ($\alpha = 0.05$) was adopted. For the effect to be considered significant, the confidence interval limits (LLCI, ULCI) had to be consistent in sign (either both positive or both negative), ensuring that zero was not included in the range.

The effect of transparency on perceived uniqueness was found to be statistically significant ($\beta = 3.60$; SE = 0.16; $p < 0.001$), with a favorable confidence interval (LLCI = 3.28; ULCI = 3.94), suggesting that the presence of transparency positively contributes to the increase in perceived uniqueness, thus confirming H2. Moreover, the relationship between perceived uniqueness and brand reputation revealed a positive and significant effect ($\beta = 0.63$, SE = 0.05, $p < 0.001$). The confidence interval (LLCI = 0.54, ULCI = 0.74) further confirms the statistical significance of this effect. Therefore, the results support H3a, suggesting that a higher perception of brand uniqueness enhances brand reputation.

The analysis revealed that perceived uniqueness is a significant predictor of purchase intention ($\beta = 0.74$, SE = 0.16, $p < 0.001$). Similarly, the confidence interval (LLCI = 0.65, ULCI = 0.84) supporting H3b and indicating that an increase in perceived uniqueness translates into a higher purchase intention. Similarly, the relationship between perceived uniqueness and word-of-mouth yielded statistically significant results ($\beta = 0.73$, SE = 0.04, $p < 0.001$). The confidence interval (LLCI = 0.63, ULCI = 0.83) confirms the effect and H3c, indicating that a higher perception of brand uniqueness stimulates positive word-of-mouth among consumers.

Overall, the results indicate a partial mediation effect of perceived uniqueness in the relationship between transparency and the three brand-related outcomes, confirming its key role in shaping consumer responses to sustainable luxury branding.

Figure 3. Regression Coefficients of Mediation Effects



Moderation

To test the moderation hypothesis H4, a two-way analysis of variance (ANOVA) was conducted to evaluate the joint effect of transparency (X: presence vs. absence) and communication Type (W: narrative storytelling vs. informative) on the mediating variable, perceived uniqueness (M). Assuming absence of transparency / informative communication as 0, and presence of transparency / narrative storytelling as 1, the results of the Two-Way ANOVA indicate that:

- *The absence of transparency / informative communication group (n = 61) reported M = 2.58, SD = 1.33.*
- *The absence of transparency / narrative storytelling group (n = 61) obtained M = 1.40, SD = 0.32.*
- *The presence of transparency / informative communication group (n = 59) recorded M = 5.19, SD = 1.39.*
- *The presence of transparency / narrative storytelling group (n = 64) obtained M = 5.98, SD = 1.37.*

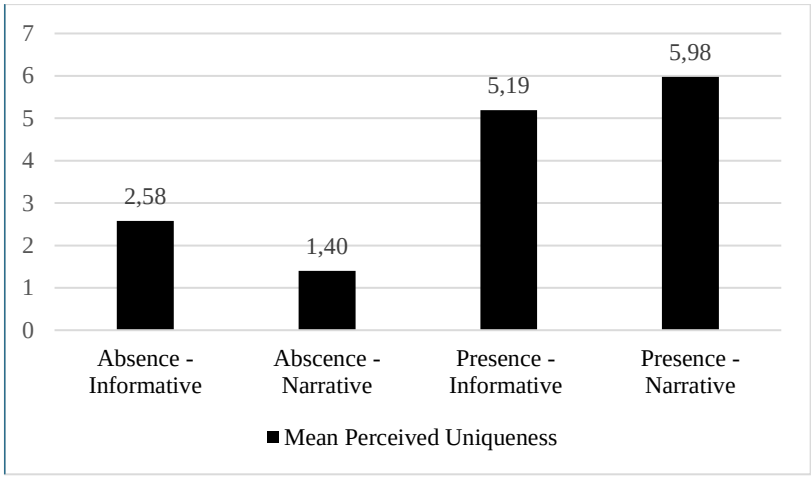
The overall model was found to be statistically significant ($F(3,245) = 201.005$, $p < 0.001$), confirming the adequacy of the model and allowing for the rejection of the null hypothesis (H0).

The analysis of main effects and interaction effects revealed:

- *Main effect of X on M: $p < 0.001$.*
- *Main effect of W on M: $p = 0.199$*
- *Interaction effect of X*W on M: $p < 0.001$*

These findings confirm that the interaction between transparency and communication type has a significant effect on perceived uniqueness, thereby supporting H4.

Figure 4. Mean Scores of Perceived Uniqueness by Transparency and Communication Type



General Discussion and Managerial implications. *In a context where luxury is experiencing a period of crisis due to the interplay of various consumer, market, and political factors, transparency regarding sustainable practices, combined with narrative storytelling, emerges as a potential lever for managers aiming to reshape their marketing strategies. These elements can positively influence brand reputation, purchase intention, and word-of-mouth recommendations, ultimately impacting consumers' decision-making. Perceived uniqueness mediates the effect of transparency on the dependent variables, underscoring the strategic role of communication in shaping consumer perceptions and brand evaluations. This is consistent with Villani and Mattiacci (2021), who found that product features - particularly those related to sustainability - can increase perceived value in the context of new luxury.*

This study contributes to extant literature by introducing an innovative theoretical framework that integrates transparency in sustainable practices as a strategic lever in luxury brand positioning and clarifies the amplifying role of narrative storytelling in generating impact. While exclusivity and secrecy have traditionally characterized luxury, the findings suggest that uniqueness can also emerge from informational openness, challenging conventional industry norms. The emotional dimension of branding is also relevant in this context. As highlighted by Shuv-Ami (2020), brands that foster emotional connection - so-called "lovemarks" - benefit from increased loyalty and advocacy. Storytelling and transparent communication can thus reinforce consumer-brand bonds and enhance positive behavioral outcomes.

From a managerial perspective, these insights provide concrete guidance for luxury marketing professionals, indicating that adopting transparency-driven communication, supported by storytelling, can strengthen consumer-brand relationships, enhance trust, and drive engagement. The findings encourage luxury brands to reconsider their approach to uniqueness, positioning transparency on sustainable practices as a strategic asset that differentiates the brand while preserving prestige and perceived value.

Limitations and Future Research. *Although this study makes a significant contribution to the literature on transparency in sustainable luxury, it presents limitations that open new avenues for future research. First, the analysis*

focused on the social and environmental dimensions of sustainability, while excluding economic aspects, which could differently influence consumer perceptions and managerial decisions.

Moreover, this study examined a single product within the apparel sector without distinguishing between product categories. Investigating whether the effects of transparency extend across various types of luxury goods could offer valuable insights, enabling comparisons that highlight potential variations in consumer responses. Future studies might also assess the impact of environmental certifications in shaping perceptions of transparency within luxury contexts.

Another limitation concerns the use of a fictitious luxury brand, selected to avoid brand-related biases. Future research could explore whether the impact of transparency differs based on a brand's pre-existing reputation, including brands involved in reputational controversies. Comparing brands recognized for their sustainability efforts and those with a history of reputational crises could provide a more nuanced understanding of trust and perceived credibility dynamics.

Furthermore, exploring how consumers react to sustainability strategies in different luxury contexts would be beneficial. A comparison between luxury fashion and fast fashion could clarify whether transparency is perceived as a differentiating value in the former or merely a baseline requirement in the latter.

From a methodological perspective, this study employed a quantitative approach, which allows for large-scale data collection but is limited in capturing deeper consumer motivations. Future research could complement this approach with qualitative methods to explore underlying perceptions and behaviors related to transparency.

Finally, the sample for this study was collected in Italy, which limits the generalizability of the findings. Future research could replicate the experiment in different cultural contexts to test the validity of the model across international markets and assess whether perceptions of transparency vary based on cultural and regulatory differences.

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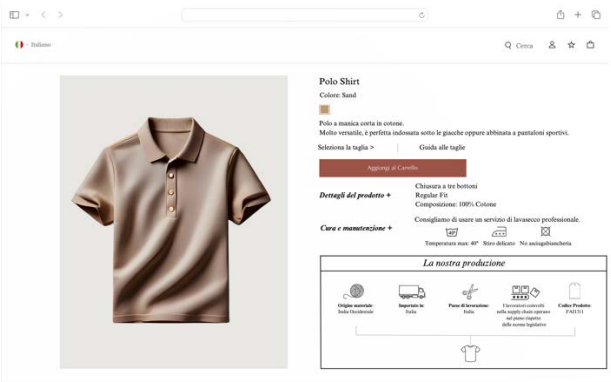
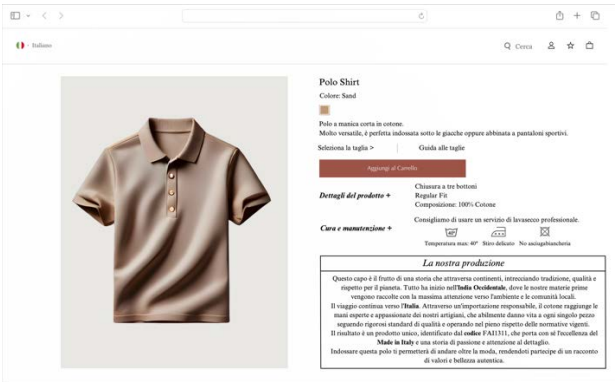
Appendix - Visual stimuli

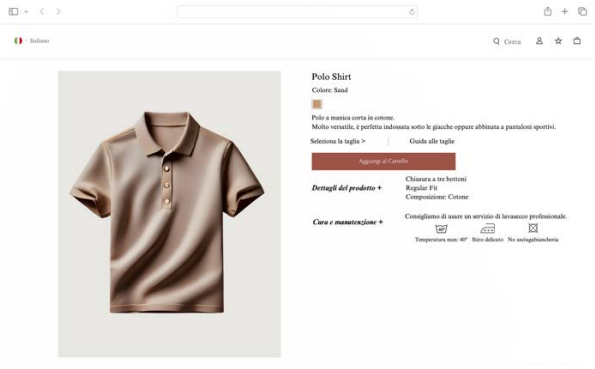
Condition 1: Presence of transparency and informative communication



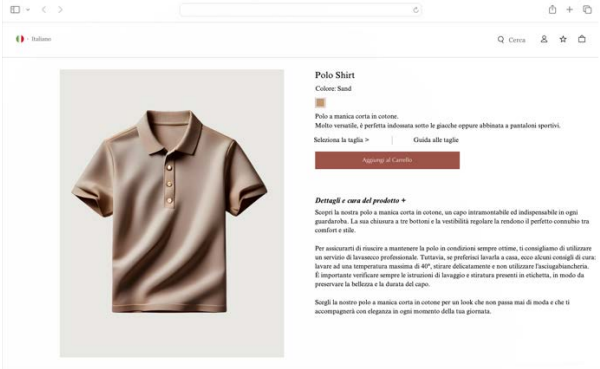
Condition 2: Presence of transparency and narrative storytelling



Condition 3: Absence of transparency and informative communication



Condition 4: Absence of transparency and narrative storytelling



Consumers' Expectations Elicited by Frozen Food Packaging Colors in Digital Environments

RAFFAELE CAMPO[1] DANIELE PORCHEDDU[2] PIERFELICE ROSATO[3] SAVINO SANTOVITO

Abstract

Research has widely shown the influence of colors on consumers' choices, in particular the colors of packages. Actually, research is more focused more on physical stores than in the online ones, despite the growing impact of e-commerce. To this end, we have organized a lab experiment with 220 participants, divided into 4 groups, involved to rate some packages of frozen foods, presented online in different hues (yellow, green, blue, and red). Specifically, they had to evaluate the perceived trust, the freshness of the product, the degree of perceived integrity of the product packaging, the shelf-life length, and the perceived degree of continuity of the cold chain. Through the application of Kruskal-Wallis tests, we found that with reference to the dimension of trust, green and yellow seem to be the best colors; with regards to sensation of freshness only yellow emerges as a successful color; finally, once again, yellow is the color which better stimulate a good perception of integrity of the package. Some managerial implications and limitations of our study are finally discussed.

Framing of the research. *Research has largely shown the role of the external appearance of products which denotes a relevant role of packaging (Creusen and Schoormans, 2005; Vieira, 2010; Silayoi and Speece, 2007) as it is also considered a 5th P of Marketing (Nickels and Jolson, 1976). It is widely recognized its impact on consumers (Sara, 1990; Pires and Agante, 2011; Rundh, 2013; Wang, 2013; Simmonds and Spence, 2017; Vergura and Luceri, 2018; Togawa et al., 2019) also in digital environments (Modi and Singh, 2021, Reinoso-Carvalho et al., 2021) even though it is essential to consider cultural differences for international marketing strategies (Ren and Chen, 2018). Spence (2016) underlines the relevance of visual attributes of packaging in terms of sensory, defined as the most important sensory cues, in particular with reference to colors, which are defined as the most important attributes, as they identify brands uniqueness, differentiate products (Yi-Chou et al., 2020) and affect competitive advantage, loyalty and also have impact on the perception of the shopping experience (Sliburyte and Skeryte, 2014). For example, Seo and Scammon (2017) and Wenting et al. (2022) highlight the ability of green to inspire environmental sensitivity. Interestingly, Gopikrishna e Kumar (2015) found that people can develop in 90 seconds an opinion on a person or a product just observing the colors, while Aghdaie and Honari (2014) affirm that colors can create an emotional connection for consumers, contributing to the increasing of sales and loyalty. Moreover, expectations and evaluations are mainly based on color (Veflen et al., 2023; Singh, 2006).*

Colors are definitely connected to emotions, for example Hemphill (1996) verified the connection between green/yellow/blue and positive emotions, because of they remind nature, sun, and sky. Gordon et al. (1994), on the other hand, studied the relationships between colors and brands, finding that they communicate the quality of a brand and peculiar characteristics of products (e.g. flavor). Recently, Berthold et al. (2024) carried on a study on package color; specifically, in their online study the participants had to observe 12 pictures representing food products with a package (different in color and material), revealing that green is the color which better inspires healthiness, whose connection with color was further studied by Marques da Rosa et al. (2018). The latter scholars, in fact, through 2 experiments investigated how visual attributes of food packaging affected perception of healthiness and taste, highlighting that packaging color affects product preference (in particular red to yellow and blue to green over grey shades) and taste associations; healthiness, on the other hand, was mainly inspired by red to yellow backgrounds (for buttery products). Moreover, Rebollar et al. (2012) explored the expectations elicited by packaging colors (and shape) in the case of chewing gums, showing a stronger relationship between colors and willingness-to-buy rather than between shape and willingness-to-buy. Influence of colors on taste is also shown by Ares and Deliza (2010) and Tijssen et al. (2017). In the first one, 105 consumers had to evaluate six images of milk packages (different in color and shape), in particular color emerged to strongly affect the expectation of flavor, specifically yellow with sweetness and vanilla, white with fruity, sourness and tasteless, black with bitterness but also with premium chocolate desserts. Tijssen et al. (2017), on the other hand, focused on sugar and fat-reduced food, through the Implicit Associations Test, explored the relationship between colors cues

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(hue, brightness, and saturation) and perceived attractiveness and healthiness of the products: they revealed that warm, saturated and less bright packages result to improve sensory expectations and perception and are considered to be more attractive and connected to less healthy products. Further findings come from Baptista et al. (2021), whose research was focused on chocolate packaging (in France and Brazil). 420 consumers were involved, with the aim to evaluate some samples of chocolate (milk and dark ones) whose package was different in colors (7 alternatives: black, blue, yellow, red, pink, brown, and green): results pointed out that bitterness was better expected by a black package, while sweetness by a pink or yellow one. Surprisingly, the expected liking varied depending on the type of chocolate: in fact, when milk chocolate was wrapped in a black packaged, the participants perceived the best expected liking while, in case of dark chocolate, black made them rate the expected liking as the worst one.

Additionally, Lunardo et al. (2021) focused on red, stressing that red food packages may have consequences such as negative cognitions and affecting a feeling of guilt (the other colors analyzed were green and blue), in particular for unhealthy products. On the other hand, Huang and Lu (2015) indicated that red affected the sweet flavor, which was perceived as higher, compared to green and blue packages, for ice cream, iced tea, cereal, and yogurt. Furthermore, Hallez et al. (2022) studied the association between colors and tastiness/healthiness/sustainability: in their study they found a connection between cool colors and expectations of lower taste (compared to warm colors) and a lower likelihood to select products whose packaging had cool colors. Hues in digital environments are object of analysis of Kunz et al. (2019). Their sample had to view some pictures of snacks in an online supermarket and rate them in terms of expected healthiness and tastiness: a group could observe grayscale images, another one images in their real colors while, in a further experiment, they had to evaluate images in increased and decreased color saturation: their results showed that there were no differences between full colors and grayscale to evoke healthiness while full color strengthened the positive relationship between healthiness and tastiness; finally, increased saturation was better predictor of healthiness and tastiness.

Purpose of the paper. *In terms of gaps, we noted the need to increase research on the impact of packaging colors in digital environments, because essentially, we did not find any studies specifically focused on this topic, which is relevant because of the dramatically growth of e-commerce. The main objective of this paper is to verify whether (and how) frozen food packages of different colors, shown in an online context, can give rise to different expectations regarding the attributes of the product and its supply chain. The choice of frozen foods was justified by the fact they represent one of the most sold food products online (Mark-Up, 2020) and, considering that they are not fresh products, they always need a package.*

Methodology. *In order to test the impact of packaging colors in digital environments, we organized an experiment, which consisted to the exposure to realistic visual stimuli represented by images depicting packaging of a widely consumed frozen product, which is frozen Brussels sprouts. We considered the real images of a product commercialized by an Italian company and modified them for our purposes.*

1) Experimental sample

The subjects involved underwent a short preliminary protocol to evaluate their suitability to participate in the experiment. As a matter of fact, considering that the experiment was based on the sense of sight, we have ascertained that:

• each participant had normal (or corrected-to-normal) visual acuity;

• each participant did not suffer from forms of dyschromatopsia (i.e. altered color perception); for this reason participants underwent an Ishihara test (Ishihara, 1917) through a specific smartphone app.

Overall, we involved 220 Italian people (100 females and 120 males).

2) Stimuli

We started chosing a real product, which was Brussels sprouts sold by a leading Italian company. We considered the original package of this product, represented in Figure 1.

Fig.1: The real package

Source: picture sourced from publicly available online source.

Then, by using a computer graphics program (Photoshop CS6) we proceeded to modify the image and to replace the original brand with a fictitious one and, finally, the verbal elements present in the package were colored black. Afterwards, we created four different versions from the real image. Each obtained image was characterized by the prevalence of a different color: yellow (RGB: 222, 223, 0), red (RGB: 223, 0, 0), green (RGB: 0, 225, 0), and blue (RGB: 0, 0, 222). The four "new" packages are therefore identical to each other, except for the prevalent color (see Figure 2).

Fig. 2: The four lab versions of the actual package

Source: Authors' own work.

3) Experimental design

To simulate an e-commerce environment, the stimuli were presented on a 21'' color CRT monitor (Sony GDM-F520, 1600×1200 pixels, 100 Hz refresh rate) controlled by a MacBook computer. The testing environment was illuminated with an Osram Daylight fluorescent light (250 lx, 5600 K). All stimuli were displayed on a frontoparallel plane positioned 50 cm from the observer.

The 220 participants were randomly assigned to one of the following 4 Groups:

1. *Group n. 1: people exposed to the predominantly blue colored packaging;*
2. *Group n. 2: people exposed to the predominantly red colored packaging;*
3. *Group n. 3: people exposed to the predominantly yellow colored packaging;*
4. *Group n. 4: people exposed to the predominantly green colored packaging.*

The experiment supervisor, after collecting data on gender, age, and level of education, asked each participant to carry out this task: "On the screen you can see a frozen product sold online. After having carefully observed the image, we ask you to formulate some evaluations regarding a series of aspects in the sheet that we will now submit to you". Then, every participant was asked to answer a series of questions (through a Likert scale from 1 to 7):

- *Q_1: the trust (in general) placed in the product observed on the screen;*
- *Q_2: the perceived degree of freshness of the product;*
- *Q_3: the degree of perceived integrity of the product packaging;*
- *Q_4: the shelf-life length of the observed product;*
- *Q_5: the perceived degree of continuity of the cold chain.*

In this experiment, the manipulated independent variable is represented by the prevailing color of the packaging to which the participants in the experiment were exposed, through the images represented on a monitor. This variable was presented in four ways (the colors) so, as written before: 1) blue 2) red 3) yellow and, finally, 4) green. The dependent variables are represented by the ratings on a Likert scale from 1 to 7, expressed by the participants with reference to the questions from 1 to 5 reported in the survey sheet. It is relevant to remind that the evaluations formulated by the participants in the experiment regarding questions from Q_1 to Q_5 were elicited in a context of ceteris paribus, except for the packaging color of the frozen product, which was different depending on the experimental group.

4) Statistical methodology

The evaluations expressed by the participants were, consequently, collected in a database and subjected, question by question, to Kruskal-Wallis tests (which is the non-parametric equivalent of the one-way between subjects ANOVA), considering the prevailing color of the package observed as between-subjects factor. A Kruskal-Wallis test is significant when at least one of the medians referring to the experimental groups is significantly different from the others and it will be necessary to proceed with specific post-hoc tests (Conover, 1999; Sheskin, 2011). Specifically, in order to identify which treatment (i.e. color) the significantly different medians refer to, one can proceed by comparing them two by two

with the Wilcoxon test for the sum of the ranks, taking care however to correct the level of significance based on the Bonferroni inequality (Conover, 1999).

Results. *Overall, 220 participants (100 females and 120 males), total average age 25.48 years (SD=5.75) were admitted to our studio. The sample size of our study (55 subjects per group) is that necessary to guarantee the statistical tests of the Kruskal-Wallis ANOVA type that we conducted, with α=0.05, a statistical power of at least 80% and to detect at least a medium effect size (Clark-Carter, 2004, pp. 239-240). We report, for each experimental condition, the mean values (SD in brackets) of the evaluations expressed by the participants in a 7-point Likert scale regarding the issues referred to in questions from Q_1 to Q_5.*

Tab. 1: Average ratings (and related SD), by package color, expressed with reference to questions from Q_1 to Q_5

Question\Color	Blue	Red	Yellow	Green
Q1	3.7 (1.5)	3.6 (1.2)	4.3 (1.4)	4.4 (1.3)
Q2	4.0 (1.6)	3.4 (1.5)	4.6 (1.6)	4.2 (1.7)
Q3	5.0 (1.6)	4.9 (1.4)	5.6 (1.3)	5.1 (1.5)
Q4	5.0 (1,6)	4.8 (1.5)	5.1 (1.4)	5.2 (1.2)
Q5	4.8 (1.4)	4.5 (1.6)	5.0 (1.6)	5.0 (1.2)

Source: Authors' own work.

For each of the questions from Q_1 to Q_5, we describe below the results of the inferential analysis conducted with the non-parametric Kruskal-Wallis test (Conover, 1999):

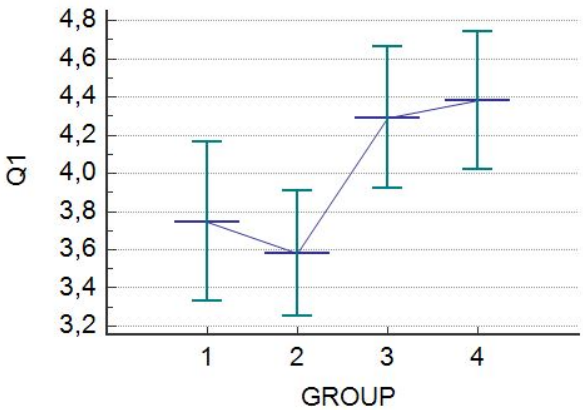
• Q_1: value of the H_t statistic (with 3 degrees of freedom and with correction for ties) = 13.64; p=0.0034 (see table 2); this test was highly significant and the post-hoc tests revealed, in pairwise comparisons, statistically significant differences between some levels of the treatment (color) in the ability to arouse trust (in general); in particular, participants showed significantly higher degrees of trust, ceteris paribus, towards products with Green and Yellow packaging compared to those with the prevalent Blue and Red colors (see Figure 3).

Tab. 2: Kruskal-Wallis test (Question 1)

Data	Q_1		
Sample size	220		
Test statistic	13.0679		
Corrected for ties H_t	13.6406		
Degrees of Freedom (DF)	3		
Significance level	p=0.003438		
Post-Hoc Analysis			
Factor	n.	Average Rank	Different (p<0.05) from factor nr
(1) Blue	55	100.17	(4)
(2) Red	55	90.74	(3)(4)
(3) Yellow	55	123.03	(2)
(4) Green	55	128.06	(1)(2)

Source: Authors' own work by using MedCalc Software v.15.2

Fig. 3: Multiple comparison graph by experimental conditions (Question 1)



Source: Authors' own work by using MedCalc Software v.15.2

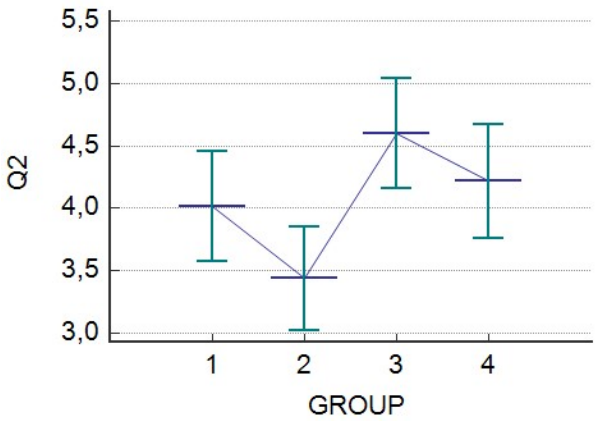
• Q_2: value of the H_t statistic (with 3 d.f. and with correction for ties) = 14.42; p=0.0019. The test was highly significant and post hoc tests showed, in pairwise comparisons, statistically significant differences between some levels of treatment in the ability to elicit the sensation of freshness(see Table 3); in particular, the Yellow has proven to be able to better convey the sensation of freshness of the product compared to Blue and Red; while Green only compared to Red (see Figure 4).

Tab. 3: Kruskal-Wallis test (Question 2)

Data	Q_2		
Sample size	220		
Test statistic	14.4150		
Corrected for ties H_t	14.8434		
Degrees of Freedom (DF)	3		
Significance level	p=0.001955		
Post-Hoc Analysis			
Factor	n.	Average Rank	Different (p<0.05) from factor nr
(1) Blue	55	108.32	(3)
(2) Red	55	86.33	(3)(4)
(3) Yellow	55	131.60	(1)(2)
(4) Green	55	115.75	(2)

Source: Authors' own work by using MedCalc Software v.15.2

Fig. 4: Multiple comparison graph by experimental conditions (Question 2)



Source: Authors' own work by using MedCalc Software v.15.2

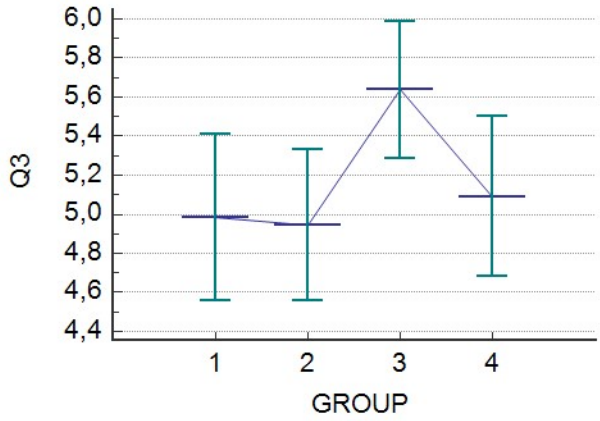
• Q_3: value of the H_t statistic (with 3 d.f. and with correction for ties) = 7.98; p=0.046.The test was significant at p<0.05 and the post hoc tests showed, in pairwise comparisons, statistically significant differences between some levels of the color treatment in the ability to arouse the idea of the integrity of the package (see Table 4); in particular, the Yellow has proven capable of arousing this idea to a significantly more intense extent than Blue and Red (see Figure 5).

Tab. 4: Kruskal-Wallis test (Question 3)

Data	Q_3		
Sample size	220		
Test statistic	7.6335		
Corrected for ties H_t	7.9853		
Degrees of Freedom (DF)	3		
Significance level	p=0.046317		
Post-Hoc Analysis			
Factor	n.	Average Rank	Different (p<0.05) from factor nr
(1) Blue	55	103.84	(3)
(2) Red	55	99.48	(3)
(3) Yellow	55	130.30	(1)(2)
(4) Green	55	108.38	

Source: Authors' own work by using MedCalc Software v.15.2

Fig. 5: Multiple comparison graph by experimental conditions (Question 3)



Source: Authors' own work by using MedCalc Software v.15.2

• *Q_4: value of the H_t statistic (with 3 d.f. and with correction for ties) = 2.54; p=0.468. The test did not allow us to reject the null hypothesis of equality of the medians relating to the different experimental conditions (see Table 5).*

Tab. 5: Kruskal-Wallis test (Question 4)

Data	Q_4	
Sample Size	220	
Test statistic	2.3992	
Corrected for ties H_t	2.5391	
Degrees of Freedom (DF)	3	
Significance level	p=0.468261	
Factor	n.	Average Rank
(1) Blue	55	111.6
(2) Red	55	100.18
(3) Yellow	55	111.60
(4) Green	55	118.75

Source: Authors' own work by using MedCalc Software v.15.2

• *Q5: value of the Ht statistic (with 3 d.f. and with correction for ties) = 4.18; p=0.243. Also in this case, the test did not allow us to reject the null hypothesis of equality of the medians relating to the different experimental conditions (see Table 6).*

Tab. 6: Kruskal-Wallis test (Question 5)

Data	Q5	
Sample size	220	
Test statistic	3.9942	
Corrected for ties H_t	4.1770	
Degrees of Freedom(DF)	3	
Significance level	p=0.242977	
Factor	n.	Average Rank
(1) Blue	55	107.73
(2) Red	55	98.13
(3) Yellow	55	121.14
(4) Green	55	115.01

Source: Authors' own work by using MedCalc Software v.15.2

Research limitations. *The results just described were obtained during a laboratory study, in a ceteris paribus context in which, in particular, several potential confounding variables were controlled (on these methodological aspects see, for example, Lambin, 2025). These variables are so called because they are able to (potentially) interfere with the cause-effect relationships between the independent variable (prevalent color of packaging) and the dependent variables included in our experimental design (variables of interest referred to in questions from Q_1 to Q_5). Among the potential confounding variables controlled during our work we can mention:*

• *the product brand, which, in addition to being the same in the four experimental groups, was also fictitious and, therefore, unknown to all participants in the experiment;*

• the further verbal and non-verbal components of the package (except for the prevailing color) were exactly identical in the images to which the four experimental groups were exposed.

Considering the laboratory nature of our study (and the consequently problems of external validity, see for example Lambin, 2025; Luceri, 2013), the results we obtained lead, overall, to believe that the color of the package of a frozen product significantly influences the perception of potential buyers in an e-commerce experience, with reference to aspects we consider important, such as the overall trust placed in the product, or the freshness or, again, the integrity of the product.

Future research could replicate the results we found in more realistic decisional contexts and consider further types of frozen products (e.g. sweets and French fries). We also hope that future research can adopt a multicultural approach to evaluate possible cultural biases on the results we obtained. Finally, from a further point of view it could also be interesting to conduct future neuromarketing research in order to study the uncontrolled reactions of the brain when observing the different packaging colors.

Managerial implications. *The main results of this study, related to digital environments, are:*

1. with reference to the dimension of trust, green and yellow were the best performing colors;

2. with regards to sensation of freshness aroused by the product, only yellow shows performances significantly different from those highlighted by the other possible colors of the package;

3. finally, with reference to the expected integrity of the package, we detected a significantly superior performance of yellow compared to the other colors.

We therefore have several reasons to believe that the color of the package of a frozen product can influence people's expectations of a series of aspects that we consider to be of interest and which can decisively influence the choice of the product during the purchase phase in an e-commerce context.

This study highlights how colors can impact on consumer's responses in a digital environment. Definitely, colors are not the only variable to influence consumers, for example we did not consider the role of the packaging size and shape, but how the choice of particular hues can play a relevant cognitive and affective influence. Certainly, the role of e-commerce today requires attention to consumers' expectations and perceptions online and this could be relevant especially for those brands which are less known and have to compete with brand leaders (let's think for example about local firms which produce frozen foods). From a managerial point of view, with reference to the variables we considered, the choice of a yellow background for the packaging appears to be the optimal one for those firms which sell frozen foods online.

Originality of the paper. *Originality of this research lies first of all in the choice of frozen food, which is rarely studied in sensory studies. Then, the focus on digital environments - in a context in which e-commerce assume more and more relevance - represents a further element of originality in particular considering that large-scale distribution (but not only) is solidly present online.*

Key words: *Packaging; Colors; E-commerce; Food Marketing; Frozen food*

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Persuasion knowledge activation versus health knowledge intervention: enhancing the effectiveness of Front-of-pack nutritional labels against misleading information

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Abstract

The rise in overweight and obesity is driving an increasing prevalence of noncommunicable and chronic diseases all around the globe, resulting in a heavier burden on individuals and higher costs for families and health systems. The presence of misleading information on food packaging exacerbates the situation by causing consumers to unknowingly choose less healthy options. Front-of-pack nutritional labels (FOPLs) have been reported as solutions to provide consumers with reliable information and be able to partially mitigate misleading information with negative consequences on consumers' health. However, FOPLs exposure presents some limitations as misleading information may divert consumer attention from FOPLs and lead them to misinterpret the product as healthier than it actually is. Therefore, further interventions are needed to empower consumers to be better informed and educated. Our exploratory experiment, including 79 participants, found that persuasion knowledge activation, compared to health knowledge intervention, are more effective in assisting Front-of-pack nutritional labels against misleading information. Hence, building of persuasion knowledge model, we examined the underlying mechanisms that motivate consumers to engage more effectively with health information (i.e., spread the negative word of mouth of products that contain misleading information), using a psychological reactance perspective.

Framing of the research.

Misleading or informative? The role of Front-of-pack nutritional labels in consumer recognition of misleading information.

Overweight and obesity have been linked to an increased risk of chronic and non-communicable diseases, such as cardiovascular diseases, cancer, and chronic respiratory diseases (WHO, 2024). Despite the increased awareness of the risks, the prevalence of overweight and obesity has risen significantly worldwide, with 43% of adults classified as overweight, and 16% living with obesity (WHO, 2024). Moreover, the prevalent use of deceptive and misleading information on food packaging, such as false nutrient content and misleading health claims, may exacerbate the issue (André et al, 2019; Pérez-Ferrer et al, 2019; Perry et al, 2018; Pulker et al, 2018). Particularly, this misleading information on unhealthy food undermines the well-established informative elements that healthy food widely use-authentic nutrient content and accurate health claims-that are intended to assist consumers in making healthier choices. Specifically, the misleading information appears with partially correct claims, which may legally and factually highlight the rich vitamin and mineral content of a product through nutrition claims, while the product as a whole is unhealthy due to high sugar content (Pérez-Ferrer et al, 2019). Similarly, to meet the criteria for a "low fat" claim, the fat content may be significantly reduced while other caloric ingredients are added to compensate for taste, ultimately resulting in a product that is less healthy overall (Schermel et al, 2016). Furthermore, there are more packaging cues that may lead consumers to misinterpret the food healthiness (de Sousa et al, 2022), such as "free from pam oil" or "free from genetically modified organism" (Hartmann et al, 2018), natural claims (Hooker et al, 2018), health trade labels (Berry and Romero, 2021), health related images (e.g., a brain image) (Delivett et al, 2022), packaging color and ecological claims (Hallez et al, 2023). Recent research gathered 3813 products from supermarket packaged food and reported that 67% of the products include health-related cues while the cues on the packages do not relate to higher nutritional value and cannot be a health indicator (Alcaire et al, 2023). While different legislations have been implemented worldwide to prevent misleading information (European Commission, 2024; FDA, 2024; Ministerio de Salud, 2016), these laws have

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several limitations, including low levels of compliance, challenges in monitoring the real adoption, and notably, the persistence of misleading practices that fall into a grey zone (Clement et al, 2017; Pulker et al, 2018). For instance, Pulker et al (2018) analyzed the packaging information of ultra-processed foods, such as breakfast cereals, snacks, and confectionery items, collected from supermarket. The study found that 56% of food packages contained nutrition claims but only 18% of these claims were compliant, while the remaining 82% being misleading. Additionally, 25% of the products featured health claims, with a compliance rate of 79% (Pulker et al, 2018). They reported that these products, which are typically high in added sugar and generally considered as unhealthy, often misuse claims to attract consumers. Moreover, marketers often comply with legislation in wording while still being misleading (Clement et al, 2017; Schermel et al, 2016).

This misleading information can be particularly harmful among consumers that are interested in pursuing a healthier diet, as they are more sensitive to the health information on packaged food. Ironically, these consumers might ultimately purchase less healthy foods for themselves due to misleading information (Miklavec et al, 2015). Notably, parents often (mis)interpret foods with misleading health information as healthier and show a higher intention to buy these less healthy options for their children, which is contrary to their intentions (Harris et al, 2011). For example, these parents interpret the 'antioxidants and vitamins' claim on the packaging as proof that the product can help prevent their children from getting sick, even if the nutrient content of product is below the average quality for the category.

The use of front-of-pack nutritional labels that are easy to understand, as a prioritized policy encouraged by WHO (2024), have been demonstrated to be an effective solution to mitigate misleading information. FOPLs are generally considered as more trustful and useful than other sources on food packages (He et al, 2023; Mazzù, et al, 2022; Mazzù et al, 2023). When existed together with misleading information (i.e., nutrient claims), FOPL has been shown to influence consumers' perceptions of a product's healthiness while misleading health information like nutrient claims do not have the same effect (Mazzù et al, 2021; Schnettler et al, 2019). Overall, FOPL has demonstrated greater relative importance than misleading information in influencing consumers' healthful perception of the product (Nobrega et al, 2020) and the existence of FOPL can sometimes eliminate the influences from misleading health information (Stoltze et al, 2021).

On the other hand, FOPL has also shown some limitations in resolving misleading health information (Mazzù et al, 2024). While front-of-pack nutritional labels can correct the bias generated by misleading information, it could happen only when consumers pay attention to the FOPL (Talati et al, 2017). Nevertheless, misleading information from graphics on food packaging are usually more appealing to attention and therefore influences consumer healthiness perception even when individuals are encouraged in advance to pay attention to FOPL information (Bone and France, 2001). Medina-Molina and Perez-Gonzalez (2021) reported that health claims that may be misleading exceed the influence of front-of-pack nutritional labels in informing consumers of the product healthiness. Similarly, recent studies reported that misleading nutrition claims cancel out the unhealthy indication suggested by Nutri-Score E (Janssen and Bogaert, 2023). Moreover, FOPLs may be perceived as a healthy symbol and therefore induce individuals to consider the product as healthier both for healthy and unhealthy food (Ikonen et al, 2020).

In response, policymakers and leading public health communicators actively employ knowledge-based interventions, such as educating consumers on effectively interpreting food labels (European Commission, 2024a) and informing consumers about the presence of misleading elements on the food package (European Commission, 2024b). One challenge to the effectiveness of such information is that it is often cognitively demanding (Gokani, 2024).

Persuasion knowledge model and psychological reactance as the empowering mechanism

The persuasion knowledge information (also referred to as disclosure of persuasion attempt of the company) may inform consumers about the food label elements more effectively.

The persuasion knowledge model (Friestad and Wright, 1994) explains how consumers develop their capabilities of recognizing and interpreting the persuasion attempts from marketers and in turn execute their own coping strategies, such as ignoring or discounting these persuasion tactics. Misleading elements on food packages, often used as a persuasive tactic to make the products appear healthy and influence consumers to purchase them, therefore, fall into the category of persuasion attempts. A recent meta-analysis has shown that persuasion knowledge can counteract marketers' persuasion effect (e.g., advertising) by 50%, which represents a substantial impact (Eisend and Tarrahi, 2022). When persuasion knowledge is activated, individuals show primarily emotional and behavioral responses, indicating that responses are automatic and fast reacting (Eisend and Tarrahi, 2022).

Although the persuasion knowledge model explains the heightened consumer responses to persuasion attempts, the underlying motivation driving these responses remains unclear (Eisend and Tarrahi, 2022; Eisend et al, 2020). In our research, we aim to use psychological reactance as the theoretical framework to explain how interventions leveraging persuasion knowledge can empower consumers to counter misleading information.

Psychological reactance theory (Brehm, 1966) posits that consumers have the need to be autonomous, such that when they feel their freedom of choice is threatened, a motivational state aimed at restoring their sense of freedom is activated. The motivation state drives individuals to respond emotionally with anger toward the subject, restricting their freedom and cognitively by arguing against the persuasive content. This motivational state has been widely studied in health communication literature, where persuasive messages promoting healthy eating are often perceived as threats to freedom. In turn, consumers not only reject the health-related messages but also feel anger toward the communicator (Lombardini and Lankoski, 2013; Lu and Cai, 2023). However, the threats that can be posed by unhealthy food promotion have been overlooked in psychological reactance literature, as people don't appear to be persuaded to exclusively choose unhealthy

options. On the other hand, the lying intention behind misleading information serves as a barrier to healthier choices. Therefore, consumer coping strategies within the persuasion knowledge model may align with the psychological reactance responses.

Purpose of the paper: *This research aims to explore whether persuasion knowledge, compared to health knowledge, contributes to increased consumer negative word of mouth about the product and to examine the underlying mechanism for this effect. Specifically, we integrate two theories-the persuasion knowledge model and psychological reactance theory-to investigate whether reactance responses serve as the empowering mechanism linking the activation of persuasion knowledge to consumer coping strategies in response to misleading persuasive attempts.*

Hypotheses:

H1: Informing consumers about the persuasion knowledge (i.e., lying intention of the food company), compared to healthiness knowledge (i.e., the unhealthiness of the food products), results in higher likelihood of spreading negative word-of-mouth about the food.

H2: The differential impact of these two types of information exposure on consumers' negative responses toward the food product and the company is mediated by reactance responses, including anger and counterargue intention.

Methodology.

Study Population: *We conducted a class experiment in an Italian university. We collected data from 79 participants (Mage = 21.89, SD=0.95; 48.1% female, 51.9% male).*

Research design: *Respondents were informed that the study is about packaged food and engaged in an evaluation task after been randomly assigned to one of two conditions categorized by knowledge intervention type ((i) persuasion knowledge; (ii) health knowledge) (see Appendix A). We measured participants' negative word of mouth of the product (Voorhees et al, 2006; 3-item), anger (Dillard and Shen 2005; 4-item), and counterarguing (Nabi et al. 2007; 4-item).*

Manipulation check

At the end of the main study, the manipulation check was added with the same 79 participants from the Italian University. Participants were asked to indicate the extent to which they thought the company had lying intention (Argo et al, 2006, 4-item). The results showed that the manipulation was successful, with $M_{(persuasion\ knowledge)} = 4.30$ *(SD = 1.21) scoring significantly higher than* $M_{(health\ knowledge)} = 3.71$ *(SD = 1.23) (t = -2.17, df = 77, p = 0.01).*

Results. *The independent t-test results confirm H1 and show the consumer negative word of mouth of the product when informed with persuasion knowledge,* $M_{(NWOM_persuasion\ knowledge)} = 4.14$ *(SD = 1.27) scoring significantly higher than health knowledge,* $M_{(NWOM_health\ knowledge)} = 3.09$ *(SD = 1.27) (t = -3.67, df = 77, p <0.01). Moreover, consumer anger response when informed with persuasion knowledge shows* $M_{(anger_persuasion\ knowledge)} = 3.52$ *(SD = 1.75) scoring significantly higher than informed by health knowledge,* $M_{(anger_health\ knowledge)} = 2.08$ *(SD = 1.24) (t = -4.26, df = 77, p <0.01). Consumer counterarguing response shows that* $M_{(counterargue_persuasion\ knowledge)} = 3.87$ *(SD = 0.94) scoring significantly higher than* $M_{(counterargue_health\ knowledge)} = 3.18$ *(SD = 1.10) (t = -3.00, df = 77, p =0.004).*

Simple mediation: we employed simple mediation test with knowledge type as independent variable, consumer anger response and counterargue as mediators, and consumer negative word-of-mouth as dependent variable.

A mediation analysis (process model 6, Hayes, 2022) confirms H2 and suggests that when consumers are exposed to persuasion knowledge, compared to health knowledge, consumers exhibit an increased level of anger towards the food company (b = 0.73, t = 4.26; p < 0.01), which in turn increases counterargue intentions toward the food company (b = 0.35, t = 5.31, p < 0.01). Furthermore, the increased anger is positively associated with a higher negative word-of-mouth of the food (b = 0.29, t = 3.29, p < 0.01) and the increased counterargue intention is positively associated with a higher negative word-of-mouth of the food (b = 0.49, t = 3.86, p < 0.01). Specifically, the direct positive effect of persuasion knowledge exposure on negative word of mouth is not statistically significant (b = 0.15, [SE] = 0.12; [CI] = -0.10, 0.39). Importantly, the indirect positive effect of persuasion knowledge exposure on negative word of mouth-through anger-is statistically significant (b = 0.21, [SE] = 0.08; [CI] = 0.08, 0.40); the indirect positive effect of persuasion knowledge exposure on negative word of mouth-through anger and counterargue intentions-is statistically significant (b = 0.13, [SE] = 0.05; [CI] = 0.05, 0.24). The study results indicate that, when exposed to persuasion knowledge, compared to health knowledge, which informs consumers misleading information on food, consumers show higher willingness to spread negative word of mouth, mediated by an increased anger and counterargue intention.

Research limitations. *The sample size is limited to 79 participants due to the class size. However, all the students were highly motivated to complete the experiment, as participation offered extra credit for the final exam, ensuring a high quality of responses. This research is based on a sample of Italian student, which may limit the generalizability of the findings. Future research should aim to test this effect across diverse cultural and demographic contexts to enhance the universality of the results.*

Managerial implications. *The prevalence of misleading health information on food packaging can prevent consumers from capturing accurate food information and may lead them to unknowingly purchase less healthy options. While FOPLs have been acknowledged by policymakers and the scientific community as an effective tool for providing consumers with reliable indicators of a food's healthiness, their sole presence has proven to be partly ineffective in limiting unhealthy choices.*

This research proposes a potential solution, highlighting that the intentional disclosure -by policymakers and public health advocates, for example- of the manipulative intent behind misleading health information could be included as part

of their communication. Specifically, our results show that informing consumers about the persuasion knowledge (i.e., persuasive intent of misleading information), as compared to healthiness knowledge (i.e., sheer healthiness knowledge about food packages displaying misleading information), leads consumers to spread more negative word-of-mouth about the company, and that the process is mediated by consumer anger and counterargue intention toward the company.

Originality of the paper. *In the food communication context, psychological reactance theory has explained how consumers respond with reactance towards the persuasive messages about healthier food because people feel compelled by the healthy food and want to restore their freedom of unhealthy food choices. However, the potential consumer reactance towards unhealthy food is overlooked in the literature. Anchored in persuasion knowledge model, we confirm, for the first time in the literature, that persuasion intent, specifically lying intention from unhealthy food companies, can activate consumer reactance, including anger and counterargue intention, to restore their freedom of choice and spread more negative word of mouth about the company that has the lying intention.*

Key words: *misleading information; front-of-pack nutritional labels; persuasion knowledge model; psychological reactance; health communication.*

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Research advances in Front-of-Pack Nutritional Labeling and stages of policy life cycles: A Systematic Review

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Abstract

Over the past years, policymakers and institutions have begun adopting Front-of-Pack Nutritional Labels (FOPLs) as an effective measure to counteract the rise in overweight and obesity, a major concern with negative consequences for individuals and health systems. The current landscape presents a wide variety of FOPL proposals, ranging from more directive to more informative solutions, within a context of varying stages of market implementation.

Through a systematic review of the most recent research on FOPLs (2020-2024), this paper aims to provide a perspective on the latest advances in the research, also showing how research productivity and areas of investigation varies across countries in different stages of the policy lifecycle. Evidence suggests that the effectiveness of FOPLs depends not only on their design and clarity but also on the regulatory framework, consumer familiarity, and broader public health strategies. This underscores the need for continuous research advancements to address varying policymaking priorities at different stages of policy development.

Framing of the research. *Obesity and overweight are major public health concerns that have been rising globally in recent decades, leading to several negative consequences for populations-such as an increase in non-communicable diseases-and placing a growing financial burden on health systems (WHO, 2024). In response, institutions and policymakers have begun implementing various countermeasures to reverse this trend, including the introduction of Front-of-Pack Nutritional Labels (FOPLs), which have been recognized as an effective strategy (Mazzù et al. 2021) to nudge consumers toward healthier and more informed food choices (Mazzù et al., 2023). While the strategic direction of introducing FOPLs is widely acknowledged as effective and necessary, significant differences exist in both "policy maturity" and execution. In more recent years, the European Commission has recognized the need for a harmonized mandatory Front-of-Pack nutrition labeling system. This initiative is part of the Farm to Fork strategy, aiming to standardize FOP labeling across the EU (van der Bende & Lissner, 2019, EU Commission 2020).*

However, as for the current state of things, we are in a fragmented regulatory landscape and market implementation, often influenced by local dietary habits, economic interests, and political priorities. In this fragmented perspective, Scholars have identified and tried to rationalize different approaches and categories of FOPLs, ranging from more directive Summary labels, such as the Nutri-Score-already implemented in several markets, including France, Germany, and the Netherlands-or warning labels, as introduced in Chile, to Nutrient-Specific labels, such as the Multiple Traffic Lights (MTL) system introduced in the UK (Mazzù et al., 2022). Moreover, as different countries are at varying stages of the policymaking lifecycle and extant research has not been conclusive on which FOPL best serves its purpose, multiple research streams seem to coexist-either focusing on validating existing solutions or exploring new ones for market implementation. Research fragmentation and intensity also appear to be linked to different stages of the policy lifecycle. During periods of intense debate and high uncertainty-such as the early stages of FOPL selection or the later stages of assessing FOPL effectiveness after market entry-research activity might increase. Conversely, policymakers rely on research to reach conclusive solutions or to determine whether further exploration of alternatives is needed: an appropriate example of this is the European Commission's decision to slow down the adoption of the NutriScore in 2022, after the collection of additional evidence on consumers decision-making processes in presence of different forms of FOPLs (Italian Food News, 2023).

Consequently, a fundamental question arises regarding researchers' investigative priorities and whether the intensity of research production is linked to different stages of policy development. In other words, the extent to which scientific research can influence policy development and, conversely, how the evolution of policy frameworks shapes researchers' interest in pursuing further investigations within this domain.

Purpose of the paper. *To have some preliminary insights to start exploring this question, we examined the evolution and advancements of FOPL research over the past five years in terms of intensity and quality, and, in parallel, observing*

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the different stages of the policy lifecycle in multiple countries. By combining (i) a systematic literature review on FOPLs and (ii) a preliminary analysis of the status of FOPL policymaking development across different regions, this study aims to provide very first insights if scientific research and policy development are synchronized in shaping future investigations.

Methodology.

Systematic Literature Review.

We conducted our investigation following the PRISMA guidelines. In the first stage, we used the search query ("= Front AND Pack AND Nutr") on the Scopus and Web of Science databases, limiting the search to peer-reviewed articles published between 2020 and 2024. This resulted in a total of 1,316 papers.*

After removing duplicates and cleaning the data, we proceeded to the second stage by assessing the relevance of the publications using the Scimago ranking (SJR). Only papers published in the top quartile (Q1) based on the SJR were retained, resulting in a subset of 1,161 articles. This subset was further narrowed down to 238 articles by selecting only those with an SJR above the calculated median for the main thematic areas.

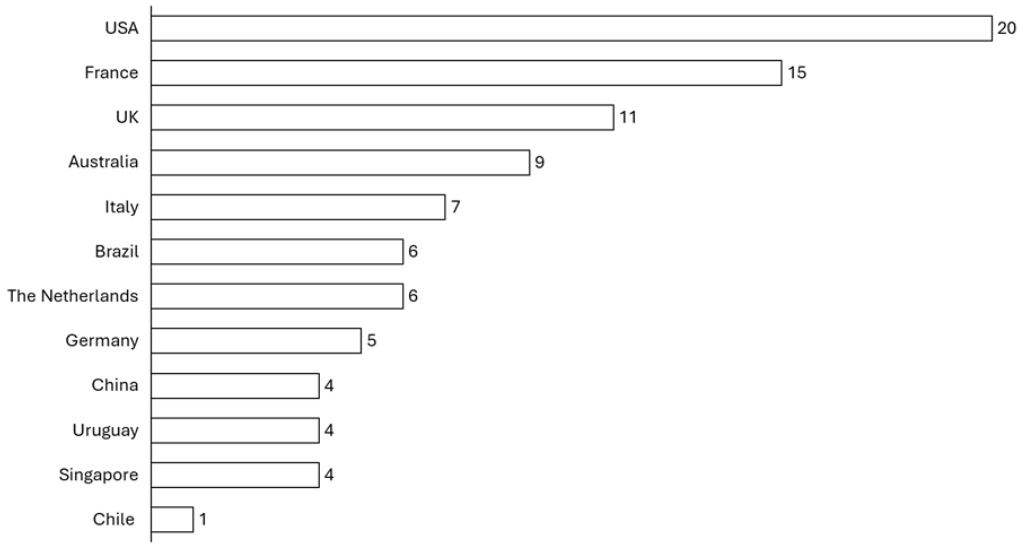
In the third stage, to ensure the inclusion of relevant and high-quality studies, we conducted a comprehensive abstract review. Studies that did not mention FOPLs or had a primary focus that significantly diverged from this topic were automatically excluded. This step ensured that the subsequent analysis was conducted on a coherent and thematically focused body of work. After this stage, the dataset was reduced to 150 articles.

In the last stage we moved to the analysis of the full text; to make the process more straightforward and to have a clearer overview of the data that would emerge from the articles, we relied on a specific classification, based on the inclusion in a dedicated file of some precise information extracted during the reading. After this process, some articles were excluded due to some inconsistencies with the objectives of this research, which did not emerge during the first screening reserved for abstracts. That led to a final pool of 106 articles, 92 of which related to specific countries.

Policy-making lifecycle

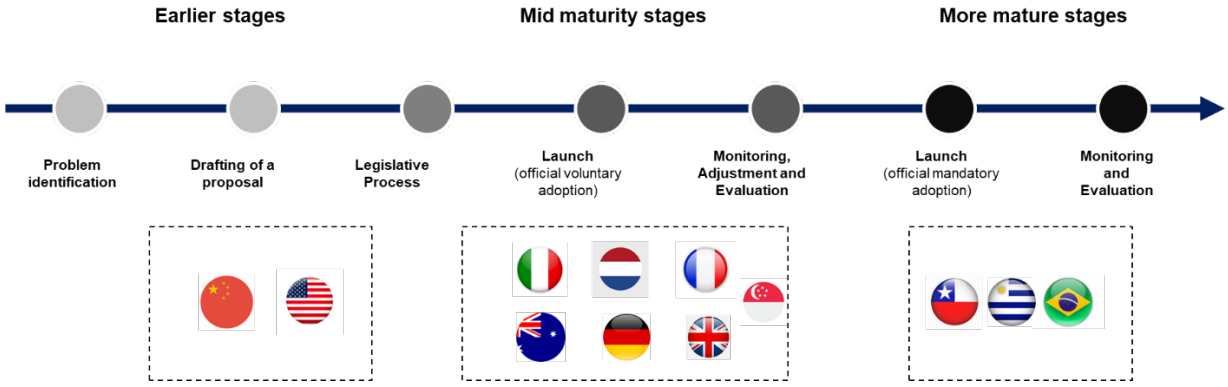
The policy making lifecycle can be articulated in some major phases: (i) Problem identification: recognizing a public health issue such as unhealthy diets and assessing the need for policy interventions, (ii) Drafting of a proposal: development of a policy framework based on research, stakeholder inputs and existing models; (iii) Legislative Process: debate, approval and formalization of the policy through legal and regulatory mechanisms; (iv) FOPL market launch (official voluntary adoption), and subsequent (v) Monitoring, Adjustments, and Evaluation, (vi) FOPL market launch with official mandatory adoption, and (vii) ongoing monitoring of the implementation of the policy, assessment of its impact and creation of the necessary adjustments. The presence of this phases in policy-development is also confirmed by previous research (Robinson, 2010) (Waylen et al. 2019).

Results. *Authors from 12 different countries were active in top journals, advancing FOPL research (Figure 1).*



These include countries at different stages of the policy lifecycle. The USA and China, accounting for a total of 24 papers (26,0%), are connected to countries in the earlier stages of policy development. A second cluster includes countries such as France, Italy, Germany, and the Netherlands, and Singapore, with the UK and Australia who are among the oldest in terms of FOPL voluntary adoption, where the national legislative process has been completed, often with voluntary adoption of an official label, while the supra-regional legislative process - at the EU level in this case - is still underway. This group accounts for a total of 57 papers (62% of the total). A final cluster includes countries where FOPLs have already been launched, and institutions are assessing their real-market effectiveness post-introduction. This last group includes mainly Chile, Uruguay, and Brazil and with a total of 11 papers (12,0% of the total).

Observing the evolution of FOPL policymaking in different countries where scientific production exists, according to the above systematic literature review, we can observe different stages in its development (Figure 2)



More details on the content in the following paragraph, ordered by frequency of occurrence.

USA

The USA is still in the development phase of FOPL. In recent years, institutions and regulatory bodies, such as the FDA, have initiated public research efforts to identify a suitable solution for the market. As of January 14, 2025, the U.S. Food and Drug Administration (FDA) proposed a mandatory FOPL, consisting in a "Nutrition Info Box", which could be able to provide accessible information that helps consumers quickly identify how foods can be part of a healthy diet. Despite that, research appears to be still in an exploratory phase and not polarized toward a specific label, with a primary focus on public health and policy implications and, to a lesser extent, consumer behavior. In addition to comprehensive reviews on the policy evolution of Front-of-Pack labeling in the Americas (Crosbie & Gomes, 2023), authors have investigated existing summary labels, using Chile as their reference country in three instances (Paraje et al. 2021). Other studies have examined responses to advertising regulations on high-calorie or high-sugar products and their effects on children's viewership (Alé-Chilet & Moshary, 2022). Other researchers have focused more on the relevance of extrinsic cues, such as label color (Oswald et al., 2022), as well as the differential effects across various socio-demographic groups (Meng & Chan, 2022). These aspects are particularly relevant as the FDA evaluates different proposals in a country characterized by a diverse range of consumer cluster. More generally, studies within this geographical cluster focus on understanding whether FOP labels have the potential to influence consumers' perceptions and the nutritional quality of their choices (Cimino et al., 2020). A specific subset of research in this cluster examines the potential acceptance of FOPLs already introduced in other markets, such as Nutri-Score (Tachie et al., 2023) or Traffic Lights (Andrews et al., 2021). Although the research is in a mature phase, rather than concentrating on a single label, these studies tend to explore various possibilities across different applications.

France

France introduced its label - the Nutri-Score - in 2017, following a long pre-qualification process. Recent studies continue to focus on the Nutri-Score and its comparative performance against other FOPL proposals, including the Brazilian NOVA classification for ultra-processed foods (Chazelas et al. 2020) the Siga classification (Davidou et al., 2020), and the FSA nutrient profiling score (Egnell et al., 2021; Dubois et al. 2021). Other researches investigate the real-market effectiveness of the Nutri-Score after several years of implementation, including its impact on decision-making influenced by advertising (Courbet et al., 2024) food reformulation (Sarda et al., 2024), and cognitive processing among specific groups, such as mothers with children (Hémar-Nicolas et al., 2024). Another major research stream focuses on supporting the Nutri-Score in EU policy development, particularly in connection with the Farm to Fork initiative. Related studies also explore the potential benefits of the Nutri-Score in other EU countries, such as Portugal (Fialon et al., 2024), among others.

UK

The UK introduced the Multiple Traffic Light (MTL) system in 2013. After an initial period of intense research, focus and interest declined following the UK's departure from the EU, reducing the need to demonstrate its superiority over EU alternatives, such as the Nutri-Score. More recent research streams have examined the use of the Multiple Traffic Lights label as a reference in policy initiatives like food reformulation (Downs & Demmler, 2020) and its interaction with other front-of-pack cues, such as eco-labels (Macdiarmid et al., 2021), green labels (Duckworth et al., 2022), and health symbols in general (Maesen et al., 2022).

Italy

Research has focused on assessing the Italian FOPL proposal - the NutrInform Battery - in comparison to other alternatives, particularly in relation to consumer decision-making. Studies have examined aspects such as understanding, preference, and willingness to adopt the label in purchase processes (Mazzù et al., 2023). While most studies compare

the NutrInform Battery to the two most relevant alternatives within the EU, some research, as recommended by EU institutions, also considers the Australian Health Star Rating (Hasni et al., 2024) and the UK Multiple Traffic Light system (Mauri et al., 2021)

Brazil

Brazil is in an exploratory phase, primarily focused on selecting a summary label that would be effective for the country. One research stream examines Corporate Political Activity (CPA), analyzing the strategies corporations use to influence policy decisions on label adoption in other South American countries, such as Chile and Colombia (Mialon et al., 2020). Other studies have specifically analyzed the "black magnifier" label, which has been in use in Brazil since 2020, investigating how its positive health effects are mitigated by the presence of on-pack claims that enhance health perceptions (França et al., 2025).

The Netherlands

The Netherlands introduced officially the Nutri-Score in 2024. Recently, most studies have focused on the policy impact of FOPLs, highlighting differences between public health and agricultural policies in France (Nutri-Score), the UK (Multiple Traffic Light), and the Netherlands (where no specific label has been officially designated) (Candel et al., 2021). Other studies compare the effectiveness of the Nutri-Score against alternatives, such as the Traffic Light system (Van Doorn et al., 2023) and the Chilean warning label (Pachali et al. 2023).

Germany

Germany adopted NutriScore for voluntary use in 2020. However, as of January 2025, some German food manufacturers have decided not to implement NutriScore, citing concerns that the system may favor products with additives over those with high-quality. Recent research focused on three main areas: (i) an experimental perspective, with works texting the effectiveness of the label through quantitative studies (Hau & Lange, 2024), (ii) policy implications (Ewert, 2024), and (iii) the extension of knowledge to eco-labeling, including the use of traffic lights applied to eco-labels (Bengart & Vogt, 2023).

China

China is also in an exploratory phase of FOPL development. The focus for this research stream is on sustainability/ environmental labeling, partly because of internal scandals concerning the origin of food products (Yang et al., 2021) (Xu et al., 2024). Papers that touch on nutritional labeling also do so by relating it to sustainability labeling (Sun et al., 2024), with a focus on color coded schemes (Liu et al., 2020).

Uruguay

One research strand, led by Gaston Ares, focuses on designing communication campaigns to promote the acceptance and positive effects of warning labels (Ares et al., 2021). Other research explores the effects of FOPLs on different product categories, such as bread (Antúnez et al., 2020) and sugar (Velázquez et al., 2023)

Singapore

Singapore implemented the voluntary Healthier Food Choice initiative in 2015, associating it to the always voluntary NutriGrade for beverages in 2022 (mandatory for C, D level). Recent research has focused on benchmarking the effectiveness of different FOPLs, comparing the country's proposed system with various alternatives, such as Nu-Val, inspired by the Nutri-Score (Li et al., 2022); the Nutritional Traffic Lights (Shin et al., 2022); NutriGrade (Shin et al., 2023); and the Nutri-Score (Shin et al., 2024).

Chile

The study considered is a good resume of the current state of research in this country. It aims at showing the effects of a large-scale mandatory FOPL regulation on consumer behavior, overall showing that the warning label effect is consistent with information disclosure influencing consumers' choices when the advertised information is unexpected (Sebastián et al, 2022)

Discussion. *This study is a preliminary attempt to observe the dynamic evolution of scientific research and policymaking in Front-of-Pack Nutritional Labeling (FOPL), with the aim of activating a reflection and stimulate a further debate on whether research influences policy decisions at different stages and, conversely how evolving regulations shape academic priorities. Findings suggest that there is no real strong link between between research present in high-end journals and policy development stages, and that the intensity of research productivity varies not necessarily based on a country's regulatory maturity. In terms of content, fragmentation appears in the selection of research topics not always aligned to policy priorities. Nevertheless, as countries differ in their FOPL adoption, research varies its focus, either assessing existing models, or exploring new solutions tailored to specific markets. Vast part of the research in all phases of the lifecycle is connected to comparative studies highlight and confronting the effectiveness of different FOPL systems (e.g., Nutri-Score, Multiple Traffic Lights, Warning Labels) in shaping consumer behavior, improving public health, and influencing industry practices. However, a disconnect remains between research timelines and policy needs.*

While institutions require timely insights, academic studies might have different research priorities. Better coordination between researchers and policymakers might be advisable to ensure findings effectively inform regulations.

Research limitations. *The study primarily focuses on articles published in top-tier journals, as classified by Scimago. Future research could expand the analysis to include additional studies, providing a broader perspective on research interests and identifying major research streams across different countries and stages of the policy lifecycle.Furthremore, real-world impact of food manufacturers' and retailers' strategic responses to labeling policies might be assessed, as well as examining how different FoP schemes influence reformulation decisions, innovation processes and practices over time, Longitudinal studies or case analyses across different market contexts could help capture how stakeholders adapt their strategies in response to changing regulatory environments, and changing consumer expectations. Moreover, the current timeriod of the analysis (2020-2024) might be extended, thus helping highlight shifts in research priorities or identify enduring research trends. Furthermore, the analysis could be enhanced by identifying patterns of relevance and the occurrence of specific topics in different phases of policy life cycles. Additionally, it could examine the extent to which research priorities are driven by institutional research calls, such as those within the From Farm to Fork strategy.*

Managerial implications. *The research identifies a shift from policy-driven studies to more applied streams of research in regions where labeling policies are well established, like France. Furthermore, by analyzing studies from marketing, public and health policy, nutrition and behavioral sciences, this work reinforces the importance of cross-disciplinary approaches. This study suggests that more is required to be understood to assess if research in top journal is connected to the policy development lifecycle, and if researchers' commitment to advancing independent, high-quality research, in specific timeframes within which research is conducted may impact policy decision-making and, ultimately, the best interests of end consumers. The findings underscore the need to create mechanisms able to foster timely collaboration between policymakers and academic researchers. Institutions could increase their demand for more diverse and independent research to provide stronger policy support, playing a proactive role and incentivizing responses to evolving societal needs. Additionally, they could formalize processes that include timely requests for research contributions. This also calls to expedite research focus that addresses phenomena that significantly impact consumers' lives and influence corporate investments - such as reformulation efforts - as well as major R&D, production, and communication strategies. The results highlight an opportunity for food manufacturers to strategically align reformulation and product innovation efforts with the consumers' expectations. Deeply understanding how labeling affects perception and choice helps companies offer healtier products without losing appeal, and collaborating with researchers on evidence-based communication can build trust and boost competitiveness. This could also be helped by building labeling standards into the early stages of product development, not just packaging decisions. Also, in the case of retailers, the present insights can inform shelf layout decisions, in-store messaging and promotional strategies aligned with the health-focus given by FoP label-usage; this is even more important if we consider that retailers can also serve as intermediaries between consumers and producers, and promote enabled and informed decision making towards more consistent labeling standards.*

Originality of the paper. *This paper presents initial observations on how research aligns with different stages of the policy lifecycle and, conversely, how various phases of policy development attract the attention of high-quality researchers.*

Although these insights should be considered very preliminary, this research establishes a discussion priority on how research can better serve to impact high-relevance topics. It also highlights the intrinsic call for top researchers to provide insights that contribute to advancing individual well-being. Exploring the reciprocal influence between policymaking and scientific research adds a novel dimension, highlighting how academic advancements can drive regulatory decisions and vice versa. This integrative approach offers fresh insights into the evolving landscape of FOPL and its broader implications.

Keywords: *Front-of-pack labeling (FOPL); Policy lifecycle; Systematic review; Consumer Behavior; Public Health*

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Understanding the Motivation of Co-Creation in Urban Living Labs: A Preliminary Study on Citizen Engagement

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Abstract

Urban Living Labs (ULLs) provide real-world environments where citizens, businesses, researchers, and governments work together to address urban challenges. Although the literature on these organisms has undergone a profound process of theoretical discussion, there is still a lack of research on how they actually work in practice, especially when it comes to involving citizens. To provide a broader and more contextualized understanding of participation in ULLs, this study adopted a mixed-methods approach, integrating survey data with semi-structured interviews. The initial survey phase aimed to identify patterns and key factors influencing willingness to engage in ULLs, while the subsequent interviews provided deeper insights into the motivations and experiences of participants. From a theoretical perspective, our preliminary results highlight a "citizen-attraction" model, showing that engagement is largely shaped by self-selecting, educated, and innovation-oriented individuals, which challenges traditional consultation frameworks and suggests that citizens' access to information does not necessarily lead to full participation in the co-creation process. Practically, the research reveals that while ULLs benefit stakeholders like businesses and local authorities by providing a platform to refine innovations and collect feedback, the selective nature of participation raises concerns about inclusivity. The motivations of citizens to participate are primarily driven by a desire to co-create products or services based on their own needs, yet the inability to innovate solutions that address the broader needs of all local communities may limit engagement, particularly among less-educated or lower socio-economic groups, ultimately restricting the impact and inclusivity of ULLs.

Framing of the research. *Urban living labs (ULLs) are gaining attention as spaces where cities experiment new solutions for urban challenges, particularly in sustainability and smart city initiatives (Bulkeley et al., 2018). These labs bring together different stakeholders-governments, businesses, researchers, and communities-to test and refine ideas in real-life settings. While much of the existing research focuses on how institutions and organizations manage and drive this co-creation process within ULLs (Puerari et al., 2018; Rahmawan-Huizenga & Ivanova, 2022), there is still limited understanding of how citizens experience and contribute to these spaces. Although both scholarly and managerial studies on ULLs suggest many benefits for different stakeholders, their nature and real contribution remain little known (Hossain et al., 2019). Moreover, despite the growing popularity of ULLs, there is still a lack of empirical research into their practical implementation and outcomes (Veeckman et al., 2013). In this vein, exploring citizen participation within ULLs may offer new insights into how they can be more inclusive and better aligned with public interests, since citizens should be considered as the primary stakeholders within smart city contexts.*

Indeed, in the literature there is still a lack of research that sheds light on citizens' motivations and behaviors in ULLs. In today's debate, the majority of the studies take a top-down perspective, looking at how these labs are structured and managed by organizations, mostly emphasizing the role played by universities, entrepreneurial activities and governments (Criado et al., 2021; Evans, 2015; Le Dinh et al., 2018). To date, there is little research on what drives individuals to engage with ULLs, what obstacles they face, and how their involvement influences their future participation. As it was noted by Kasri et al. (2017) the importance of understanding the structure, culture, and process within a community's living and their motivations is crucial to assess the citizen engagement. Since the ULL approach is believed to close the gap between production and actual market uptake by directly involving all end users and other urban stakeholders in the development of new products or services (Steen & Van Bueren, 2017), it is crucial both for researchers and practitioners, to have a clear understanding of how the process of directly involving citizens can be triggered by starting from their needs and inner motivations. Our investigation lies in the current gap, by framing the attention on how ULLs can be efficiently designed by posing its focus on citizens life.

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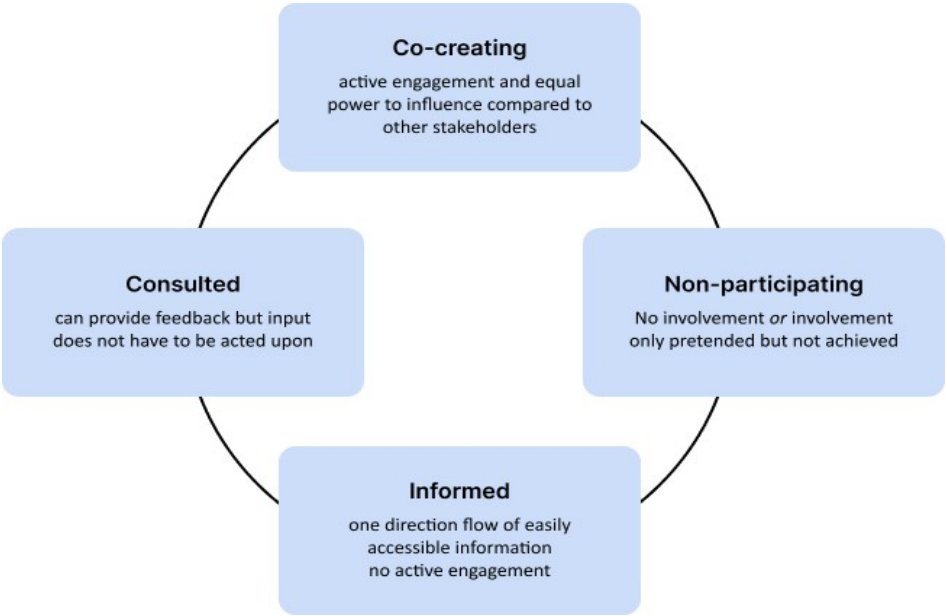
Purpose of the paper. *To address this gap, this study draws on concepts from citizen engagement and political participation research to explore how everyday behaviors and personal motivations influence citizens' willingness to participate in ULLs. While participation is often limited to formal feedback mechanisms, such as surveys or committee involvement, or informal actions like protests or petitions, this study takes a broader view. It acknowledges that engagement can also occur through everyday activities, which, although often overlooked, have a significant impact on both the individual and collective level. These everyday practices, such as recycling, energy conservation, or participating in local community initiatives, allow citizens to engage with ULLs on complex issues, including those that affect them personally, like climate change or urban mobility. By focusing on these subtle yet impactful forms of participation, this research emphasizes that public engagement is not merely about formalized channels of input but also about how citizens interact with and respond to issues in their daily lives. In fact, public participation, when fully understood, includes these everyday practices, which Marres (2012) refers to as "everyday practices of engagement," that are integral to a more comprehensive understanding of citizen involvement. These forms of engagement often provide insights into how citizens are willing to actively shape the urban environments they inhabit, even when they are not part of formal decision-making processes. Building on Menny et al.'s (2018) framework of four levels of participation within ULLs, ranging from no participation to the highest degree of co-creation and decision-making, this study aims to provide a tailored comprehension of the degree to which citizens are engaged in ULLs (Fig.1).*

Fig. 1: Levels of participation, adapted from Menny et al. (2018)



Source: Authors' own elaboration of Menny et al. (2018)

By examining these varying levels of involvement, we seek to uncover the underlying factors that drive citizens to participate (or not participate) in these processes, offering a clearer picture of how ULLs can be designed to foster deeper engagement across diverse community groups. For these reasons, our research question is structured as follows: "What factors influence citizens' decisions to engage or not engage in Urban Living Labs?" To answer this question, the study will employ a mixed-methods approach. The research context of our work focuses on sustainability-themed ULLs, as these are among the most common and impactful (Bulkeley et al., 2018). These labs often tackle issues such as climate change, renewable energy, waste reduction, and sustainable mobility, all of which require active community participation to succeed. Our methodology is structured as follows. First, a survey was conducted to measure how citizen engagement and pro-environmental behavior impact willingness to participate in ULLs. This helped us to identify broader trends and patterns to build our interview protocol. Then, semi-structured interviews with ULL participants provided deeper insights into how their experiences influence their perceptions of ULL effectiveness and their willingness to participate and engage in the co-creation process.

By combining insights from urban innovation studies and citizen engagement research, this study aims to offer a clearer picture of citizen participation in ULLs. From a theoretical perspective, it highlights a new and more realistic citizen engagement model, showing what factors activate (or not) the willingness to co-create in ULLs. Practically, our preliminary findings will support policymakers, urban planners, and ULL organizers design more inclusive and effective co-creation processes that genuinely engage the people they aim to serve.

Methodology. *Research on living labs has predominantly relied on qualitative methods such as case studies and interviews (Bulkeley et al., 2018; Puerari et al., 2018; Rahmawan-Huizenga & Ivanova, 2022). To provide a broader and more contextualized understanding of participation in ULLs, this study adopted a mixed-methods approach, integrating survey data with semi-structured interviews. The initial survey phase aimed to identify patterns and key factors influencing*

willingness to engage in ULLs, while the subsequent interviews provided deeper insights into the motivations and experiences of participants. This combination allowed for a more comprehensive analysis, where broad trends identified through surveys were complemented by qualitative descriptions that clarified concepts such as "sense of ownership" (Puerari et al., 2018).

The study was conducted across three Amsterdam-based urban living labs focused on plastic waste reduction that are hosted by a research body, the AMS Institute for Advanced Metropolitan Solutions. The three ULLs are located in the neighborhoods of Centrum, Zuid, and Nieuw-West. These labs aimed to engage local residents in co-creating solutions to urban plastic waste issues. Participants were recruited through an open call and AMS's network. The survey, distributed via mail with a QR code linking to an online Qualtrics form, was available in Dutch, English, Arabic, and Turkish to ensure accessibility, especially in a multicultural setting like the Netherlands. The questionnaire measured willingness to participate in ULLs, adapting a protest potential scale from Kwak (2021), civic engagement using the Civic Engagement Scale (CES) (Remr, 2023), and topic awareness following Irani et al. (2023), with an additional question from Marres (2009) regarding environmentally conscious behaviors. Socio-demographic data were collected using measures from the European Social Survey (2022), including age, gender, household size, length of residence, employment status, education level, household income, and ethnic background. Given prior findings that household size may influence participation (Park & Fujii, 2023), while gender and civic engagement showed no clear correlation (Remr, 2023), these variables were considered as potential factors in participation willingness.

After analyzing survey responses, semi-structured interviews were conducted with selected participants at the lab locations. The interviews, lasting approximately 40 minutes each, aimed to contextualize survey findings and explore motivations in greater depth. When possible, interviewees were drawn from the survey sample to facilitate within-subject comparisons. If a participant had not previously completed the survey, they were asked to do so before the interview. This ensured alignment between quantitative and qualitative data. Five interviews were conducted per lab, totaling fifteen interviews. Thematic analysis (Braun & Clarke, 2006) was applied to the interview transcripts, which were manually processed in Google Docs and coded in Google Sheets.

Despite the challenges of a mixed-methods design, such as managing workload and reconciling conflicting data, this approach provided a more detailed understanding of participation in ULLs. While the survey captured general trends, interviews clarified underlying motivations and variations in participant perceptions and subsequent degree of engagement within ULLs. By integrating both quantitative and qualitative data, the study aimed to strengthen its validity and offered a detailed perspective on the factors influencing participation in ULLs.

Results. *Although our data analysis is still in a stage of work in progress, we are capable of showing our expected results. Preliminary findings from this research offer insights into citizen engagement within ULLs contributing both theoretically and practically to the field. The first analysis conducted within the textual matrix suggests that participation in ULLs frequently follows a "citizen-attraction" model, where engagement is largely shaped by self-selecting groups-typically individuals with higher education levels, professional backgrounds, and specific interests related to innovation and urban development. This pattern aligns with much of the existing literature, which suggests that ULLs tend to attract participants who are already predisposed to innovation, co-creation, and active civic engagement (Gascó, 2017). These individuals are often (already) motivated by an inner desire to contribute to societal change and to collaborate in shaping solutions for urban challenges.*

However, from the perspective of key stakeholders-such as companies, startups, and local authorities-this selective engagement is often viewed favorably and almost desired. These actors benefit not only from the opportunity to showcase their products and services within ULLs but also from gathering valuable feedback, testing ideas in real-world settings, and collecting data during co-creation sessions. ULLs therefore serve as collaborative spaces where private sector actors can refine their innovations with input from an engaged, yet specific, subset of the population that get to give their contribute to the co-creation process on specific themes. This process of co-creation provides a dual benefit that aligns with the ongoing debate: it helps the private sector in adapting their solutions while also empowering citizens who feel invested in the development process (Følstad, 2008; Rahmawan-Huizenga & Ivanova, 2022). In this vein, the motivation of citizens to participate in ULLs seems to be related to a need to co-design product or services based on their specific needs from a utilitarian point of view rather than a full engagement. From a theoretical perspective, this study positions itself within an informed approach to consultation, drawing on Menny's framework. In this context, citizens have access to information, yet this does not necessarily translate into an active, consultative role within the co-creation process. The new role of attraction acts as a filter between these two stages, complicating the transition for all citizens into the third phase. This creates a barrier that potentially hinders full participation and engagement, ultimately undermining the effectiveness of the co-creation process. By introducing this filter, the study suggests that while citizens may be informed, their actual involvement in shaping outcomes is limited, which could reduce the inclusivity and success of ULL initiatives.

This model of selective participation raises critical questions about inclusivity. The apparent tendency for ULLs to attract a homogeneous group of participants-often from higher socio-economic backgrounds, with higher levels of formal education, and with an existing interest in innovation-poses challenges for ensuring equitable, inclusive and "spontaneous" and more committed citizen engagement. Specifically, starting from our survey, our preliminary findings highlighted the difficulty of engaging a broader and more diverse cross-section of the community, particularly those from lower socio-economic groups or with less formal education. Although we tried to expand our dataset by incorporating different languages and including different participants, citizens that happened to be truly involved in the process had

similar characteristics (the afore mentioned "higher socio-economic backgrounds, with higher levels of formal education, and with an existing interest in innovation"). Therefore, the motivations of citizens lie in contributing, together with other actors in the ULLs, to the creation of products. However, the lack of motivation for participation in ULLs among certain segments of the population may stem from the inability to innovate products and services that can truly benefit all local communities.

Research limitations. *This research has several limitations that need to be acknowledged. First, our findings are not easily generalizable to all ULLs as these initiatives operate in diverse contexts and are shaped by varying levels of governmental support. The influence of local authorities is particularly strong, and different political climates, policy frameworks, and financial backing across municipalities can significantly affect how ULLs function and succeed. As a result, our conclusions may not apply universally to ULLs in different countries or regions with contrasting socio-political conditions. This limits the external validity of our study, particularly when considering how ULLs in other parts of the world might operate under different circumstances.*

Second, since our study employs qualitative methods, there is always a potential for researcher bias in the data collection and analysis process. For example, the way interview questions were framed, how citizens were selected within ULLs, and how we interpreted their responses could have influenced the results. Although we made efforts to minimize subjectivity by incorporating an initial survey, qualitative research inherently involves a degree of interpretation. Future studies could improve upon this by integrating different data sources or employing mixed-methods approaches to increase reliability and provide a fuller, more balanced understanding of the issues at hand.

Third, while we have gained some insight into the motivations behind citizens' engagement in ULLs, these findings are still partial. The personal, cultural, and socio-economic factors that drive or prevent people from participating in co-creation processes are complex and multifaceted. Our research has highlighted some key motivators and barriers, but there is a need for further exploration to better understand the full range of influences at play. This deeper investigation could provide a clearer picture of how to design more inclusive ULLs that engage a wider variety of citizens.

Managerial implications. *From a managerial perspective, these findings have direct implications for the design and organization of ULLs. Organizers must consider strategies to make participation more accessible and appealing to a wider audience, particularly by addressing the barriers that prevent certain groups from engaging. This may involve simplifying communication to ensure that information about the labs is clear and widely disseminated, fostering trust within communities through partnerships with local organizations, and co-developing innovation challenges that align with the concrete needs of different social groups. Moreover, understanding the motivations and obstacles to participation is crucial for refining ULL frameworks in ways that maximize their effectiveness and societal impact. Ensuring that diverse voices are included not only improves the legitimacy of the co-creation process but also increases the likelihood of developing solutions that truly respond to the complexities of urban life, especially in multicultural setting like the Netherlands or similar. Finally, this study provides an initial step toward assessing the performance and practical organization of ULLs, offering empirical data that can guide future research and managerial improvements. Finally, our work has implications for private stakeholders. Indeed, citizen engagement and attraction within ULLs are perceived positively by companies and start-ups, which benefit from the opportunity to present their ideas, receive valuable feedback, and collect data from co-creation events. These dynamics highlight the key drivers that lead different stakeholders to participate in ULLs and provide insight into how these interactions unfold. However, an important challenge remains: how to ensure that ULLs engage a broader and more diverse segment of the population, particularly vulnerable or less-educated citizens who might not see these initiatives as relevant or accessible.*

Originality of the paper. *The originality of this paper lies in its comparative approach, which seeks to address gaps in the literature by providing a deeper understanding of how to effectively attract citizens to ULLs (Hossain et al., 2019; Veeckman et al., 2013). While previous studies have explored participation dynamics, this research goes further by offering a more tailored analysis of the factors that influence citizen engagement. Moreover, the use of a mixed-methods approach represents an advancement over traditional methodologies, allowing for a more comprehensive exploration of both quantitative trends and qualitative insights (Bulkeley et al., 2018; Puerari et al., 2018; Rahmawan-Huizenga & Ivanova, 2022). In addition, compared to existing frameworks on Living Labs, this study is among the first to provide concrete empirical evidence on their ability-or, more specifically, their limitations-in creating value. While much of the literature focuses on theoretical models and best practices (Følstad, 2008) our findings, although in a preliminary form, offer a data-driven perspective on the real challenges these initiatives face in fostering meaningful citizen engagement. This empirical contribution not only contribute the academic discussion on Living Labs but also provides valuable insights for practitioners looking to design more effective and inclusive co-creation processes.*

Keywords: *urban living labs; citizen participation; co-creation process; citizen attraction; citizen motivation; smart cities*

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Bridging the Trust Gap and Digital Divide: A Dual-Path Model of Public Service Satisfaction

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Abstract

This study investigates the determinants of satisfaction with digital public services, focusing on Italy's healthcare booking system. Grounded in the e-GovQual framework, we model service quality as a second-order construct encompassing efficiency, reliability, and privacy while introducing trust in public actors and digital anxiety as critical elements in the relationship between service quality and users' satisfaction. Using survey data from Veneto and Emilia Romagna (n = 839), we conducted two complementary analyses: a mediation model (model 1) and a multi-group analysis stratified by digital anxiety (model 2). Results reveal that service quality drives satisfaction directly, with trust in public actors mediating this relationship. However, digital anxiety reshapes these dynamics: high-anxiety users rely on trust and positive attitudes to compensate for technological discomfort, while low-anxiety users prioritise functional performance alone. By integrating institutional trust and digital anxiety into the e-GovQual framework, this study advances a dual-path model of public service satisfaction, offering some insights for fostering inclusive digital governance.

Keywords: *Public service satisfaction; Trust in government; Digital anxiety; e-GovQual framework*

Framing of the research. *The Italian public health system is rooted in the national constitution, which defines the division of legislative responsibilities between the state and regions for health protection. Despite ongoing debates about this division (Gorlani, 2023), healthcare remains a matter of public interest, ensuring universal and equitable access to services through the National Health Service (SSN). Established in 1978, the SSN is built on the principles of universality, equality, and equity, offering healthcare services either free of charge or at minimal cost. The system's organisation relies on local health authorities (ASL) and hospitals, with the Ministry of Health and regional agencies overseeing service quality and evaluating citizen satisfaction.*

In recent years, digitalisation has become a key focus in public health service management, with expectations that it would drive innovation and improve efficiency. The European Union's NextGenerationEU programme, implemented in Italy through the National Plan for Resistance and Resilience (PNRR), has reinforced this push toward digital health solutions. However, despite its strategic importance, the digitalisation of public healthcare services has encountered significant challenges, including regional disparities and limited adoption of digital alternatives such as online appointment booking and telemedicine (Vaagan *et al.*, 2021). *A crucial issue remains the lack of a user-centred approach in the design and implementation of these services, which contributes to persistent inefficiencies.*

Citizen perceptions and attitudes toward these services are pivotal as they shape long-term engagement with these new tools, with digitalised healthcare being no exception: satisfaction with the e-services influences adoption and continuity of use. Grounded in the e-GovQual framework (Papadomichelaki and Mentzas, 2012), this study examines how service quality dimensions-efficacy, privacy, and reliability -shape satisfaction of a specific service offered by the healthcare system (i.e., online booking system) through two distinct lenses: (1) trust in the public actor and user attitudes, and (2) citizens' digital capacity, operationalised as computer anxiety (i.e., stress or discomfort when interacting with digital tools).

Purpose of the paper. *This paper aims to advance the understanding of public service satisfaction by investigating how institutional trust and user attitudes mediate the translation of service quality (e.g., efficacy, privacy, reliability) into satisfaction, offering insights into the mechanisms that underpin citizen-state interactions. Moreover, it examines how digital anxiety - a barrier rooted in users' technological discomfort - moderates these relationships, revealing whether and why service quality and trust matter differently across subgroups with varying digital readiness.*

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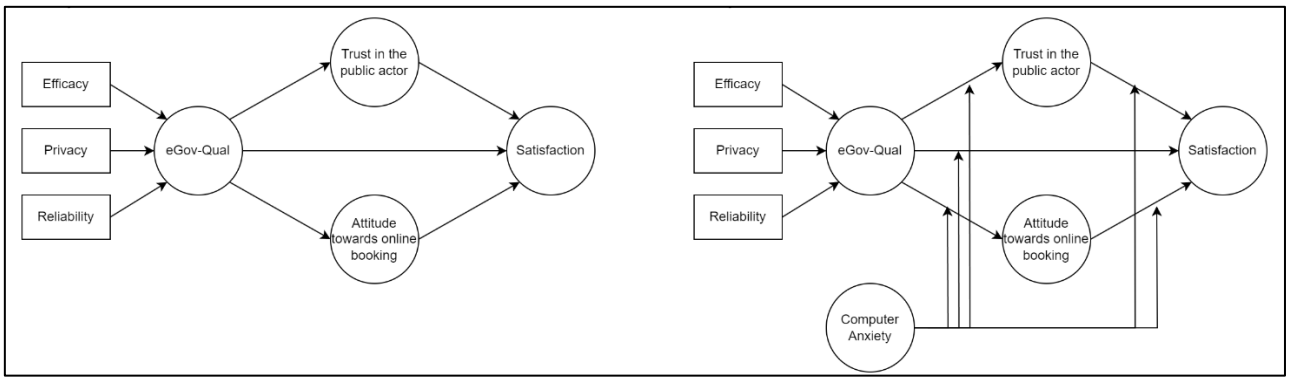
To achieve this, we propose two complementary models. The first one is a baseline mediation model, positing that trust in public institutions and user attitudes act as dual channels through which service quality influences satisfaction. Trust here embodies citizens' confidence in the public actor and its actions, while attitudes reflect their openness to digital service adoption. The second model extends the first by introducing digital anxiety as a moderating variable. Using multi-group analysis, we clustered users into high- and low-anxiety cohorts to test whether the strength of relationships between service quality, trust, and satisfaction diminishes or intensifies among digitally anxious individuals. The models are depicted in Figure 1.

Figure 1: The proposed theoretical models



Methodology. *The study draws on data collected through an online survey conducted in February 2024 across two northern Italian regions, Veneto and Emilia Romagna. Participants were invited to complete a structured questionnaire designed to assess their experiences with digitalised public healthcare services. The survey comprised two primary sections. The first section captured socio-demographic characteristics, including age, gender, and occupational status, while the second focused on the study's core constructs, measured using validated scales adapted to the Italian healthcare context. All items were modelled on a 7-point Likert scale (1 = absolutely disagree, 7 = absolutely agree). Participants were allotted 10 minutes to complete the survey, resulting in 839 valid responses after removing incomplete or inconsistent entries. The final sample was predominantly female (71.75%), aged 30 or older (53.15%), and the majority of respondents were employed full-time (42.19%).*

The measures of service quality-efficiency, privacy, and reliability-were adapted from the e-GovQual framework (Papadomichelaki and Mentzas, 2012), while trust in public actors was measured using items derived from Teo et al. (2008) trust in government scale. Satisfaction with e-services was assessed through a modified version of Li and Shang's (2020) satisfaction scale. Computer anxiety was measured using the scale developed by Lester et al. (2005). For the attitude scale, we followed the guidelines provided by Ajzen (2001).

The validity and reliability of the measurement model were evaluated using confirmatory factor analysis (CFA) with MLR estimator. The model showed strong fit indices: $\chi^2 = 499.47$ (df = 180), RMSEA = 0.06, CFI = 0.94, TLI = 0.93, and SRMR = 0.05 (Hu and Bentler, 1999). Convergent validity was confirmed through composite reliability and average variance extracted values exceeding the thresholds of 0.70 and 0.50, respectively, alongside standardised factor loadings surpassing 0.50 (Hair et al., 2018). Further evidence of reliability emerged from ordinal alpha coefficients, which exceeded 0.70 for all latent constructs (Zumbo et al., 2007), reinforcing the internal consistency of the scales. Notably, service quality was modelled as a second-order construct formed by efficiency, privacy, and reliability. It demonstrated good reliability with an ω value of 0.81 (Flora, 2020). For discriminant validity, all square roots of AVE estimates were greater than the corresponding inter-construct correlation, and the HTMT values did not exceed the value of 0.85 (Fornell and Larcker, 1981; Henseler et al., 2015).

To estimate the two models, we randomly partitioned the data into two groups. By testing on independent subsets, the risk of overfitting is reduced, and the generalizability of findings is enhanced. This approach also validates that observed relationships are consistent across different samples (Hair et al., 2018).

Model 1 Results.

Model 1 revealed significant direct effects of service quality (eGovQual) on user attitudes ($\beta = 0.57$, 95% CI [0.44, 0.68]) and trust in public actors ($\beta = 0.64$, 95% CI [0.54, 0.73]), as well as a strong, direct association with satisfaction ($\beta = 0.71$, 95% CI [0.56, 0.89]). Trust exhibited a modest yet significant positive relationship with satisfaction ($\beta = 0.19$, 95% CI [0.02, 0.32]), while attitudes showed no meaningful link to satisfaction ($\beta = -0.02$, 95% CI [-0.17, 0.07]). Indirect effects further clarified these dynamics: the mediation pathway through trust was significant ($\beta = 0.12$, 95% CI [0.02, 0.20]), whereas the pathway via attitudes was negligible ($\beta = -0.02$, 95% CI [-0.11, 0.05]). The total effect of service quality on satisfaction remained robust ($\beta = 0.82$, 95% CI [0.75, 0.89]), emphasising its central role in shaping user experiences.

Table 1: Estimates of the proposed models

	β	Boot.se	Boot.CI.	
Direct effect			**Lower**	**Upper**
e-GovQual → Attidute				
Model 1	0.57	0.05	0.44	0.68
Model 2: low computer anxiety	0.53	0.09	0.33	0.68
Model 2: high computer anxiety	0.60	0.06	0.46	0.70
e-GovQual → Trust in public actor				
Model 1	0.64	0.04	0.54	0.73
Model 2: low computer anxiety	0.48	0.08	0.30	0.64
Model 2: high computer anxiety	0.47	0.6	0.32	0.59
e-GovQual → Satisfaction				
Model 1	0.71	0.08	0.56	0.89
Model 2: low computer anxiety	0.79	0.09	0.64	0.91
Model 2: high computer anxiety	0.53	0.09	0.35	0.72
Trust in public actors → Satisfaction				
Model 1	0.19	0.07	0.02	0.32
Model 2: low computer anxiety	0.15	0.08	-0.02	0.28
Model 2: high computer anxiety	0.19	0.06	0.07	0.32
Attitude → Satisfaction				
Model 1	-0.02	0.07	-0.17	0.07
Model 2: low computer anxiety	-0.09	0.09	-0.30	0.05
Model 2: high computer anxiety	0.23	0.09	0.03	0.40
Indirect Effects				
e-GovQual → Trust in public actors → Satisfaction				
Model 1	0.12	0.04	0.02	0.20
Model 2: low computer anxiety	0.07	0.03	-0.01	0.13
Model 2: high computer anxiety	0.09	0.03	0.03	0.15
e-GovQual → Attidute → Satisfaction				
Model 1	-0.02	0.04	-0.11	0.05
Model 2: low computer anxiety	-0.05	0.05	-0.19	0.02
Model 2: high computer anxiety	0.14	0.05	0.02	0.24
Total effect				
e-GovQual → Satisfaction				
Model 1	0.82	0.03	0.75	0.89
Model 2: low computer anxiety	0.81	0.04	0.73	0.89
Model 2: high computer anxiety	0.76	0.04	0.66	0.85

Note: The results are controlled for the covariates of gender, age, frequency of use of the service, and region of provenience. Before conducting the multi-group analysis (i.e., model group), we established invariance on factor loading and intercepts (Chen, 2007). To estimate indirect effects, we employed bootstrapping (5000 samples) with bias-corrected confidence intervals (Preacher and Hayes, 2008). This non-parametric resampling method accounts for non-normality in mediation pathways and provides robust estimates of indirect effects.

Model 2 Results.

The multi-group analysis comparing low- and high-computer anxiety subgroups revealed distinct patterns in the relationships between service quality, trust, attitudes, and satisfaction. For low-anxiety users, service quality (eGovQual) exhibited a strong direct effect on satisfaction (β = 0.79, 95% CI [0.64, 0.91]), with weaker associations for trust (β = 0.15, 95% CI [-0.02, 0.28]) and a non-significant link between attitudes and satisfaction (β = -0.09, 95% CI [-0.30, 0.05]). Indirect effects via trust (β = 0.07, 95% CI [-0.01, 0.13]) or attitudes (β = -0.05, 95% CI [-0.19, 0.02]) were negligible, resulting in a total effect of eGovQual on satisfaction of β = 0.81 (95% CI [0.73, 0.89]).

In contrast, high-anxiety users showed a reduced direct effect of service quality on satisfaction (β = 0.53, 95% CI [0.35, 0.72]), alongside a significant positive relationship between attitudes and satisfaction (β = 0.23, 95% CI [0.03, 0.40]) and a stable trust-satisfaction link (β = 0.19, 95% CI [0.07, 0.32]). Indirect effects for this subgroup were notable: trust mediated the relationship (β = 0.09, 95% CI [0.03, 0.15]), and attitudes emerged as a significant mediator (β = 0.14, 95% CI [0.02, 0.24]), yielding a total eGovQual effect of β = 0.76 (95% CI [0.66, 0.85]). These results underscore digital anxiety as a critical moderator, attenuating direct service quality effects for high-anxiety users while amplifying the roles of trust and attitudes in shaping satisfaction.

Short Discussion.

This study elucidates the interplay between service quality, trust in public actors, and digital anxiety in shaping satisfaction with Italy's digitised healthcare services. By modelling eGovQual as a second-order construct encompassing efficiency, reliability, and privacy, we demonstrate that holistic service quality constitutes the cornerstone of user satisfaction. However, the pathways through which this quality translates into satisfaction diverge markedly based on users' digital readiness, underscoring the necessity of adaptive policy frameworks that address both technical performance and psychosocial barriers.

The robust total effect of eGovQual on satisfaction (β = 0.82 in Model 1; β = 0.76–0.81 in Model 2) reaffirms the centrality of functional excellence in public e-services. Efficiency and reliability-capturing ease of use, accuracy, and

timeliness-emerged as the primary drivers of satisfaction, consistent with prior work emphasising the non-negotiable nature of technical performance in digital governance (Li & Shang, 2020; Papadomichelaki & Mentzas, 2012).

Trust in public actors emerged as a relational mediator. In Model 1, trust partially bridged the gap between service quality and satisfaction (β = 0.12), highlighting that institutional legitimacy amplifies the benefits of technical performance. This aligns with (Tolbert and Mossberger, 2006) assertion that e-government can foster process-based trust, though our findings reveal its role as contingent rather than universal. For high-anxiety users in Model 2, trust in public actors remained a stable mediator (β = 0.09), serving as a psychological anchor to mitigate digital discomfort. In contrast, low-anxiety users derived satisfaction almost exclusively from direct service experiences (β = 0.79), with trust playing a negligible role. This bifurcation underscores how institutional trust functions to offset the negative effects of digital anxiety on satisfaction.

Digital anxiety, operationalised through the lens of computer anxiety (Lester et al., 2005), emerged as a structural moderator reconfiguring user priorities. High-anxiety users relied on both service quality and psychosocial factors-trust in public actors (β = 0.19) and positive attitudes toward digital services (β = 0.23)-to achieve satisfaction. For these users, satisfaction is not merely a product of functional performance but the result of the interplay between technical efficacy and relational and attitudinal aspects. Low-anxiety users, conversely, exhibited a technically oriented relationship with e-services, prioritising efficiency and reliability while remaining indifferent to institutional trust or attitudes. In summary, these results highlight a bifurcation: digitally confident users prioritise functionality, whereas anxious users require both technical and relational assurances to derive satisfaction.

Research limitations. *This study's findings must be interpreted within several constraints. First, the data were collected from two northern Italian regions (Veneto and Emilia Romagna), limiting generalizability to southern Italy, where digital infrastructure and citizen-state dynamics may differ. Second, the focus on healthcare services-a high-stakes, low-frequency context-may amplify the salience of reliability and trust compared to routine services (e.g., tax filings). Third, the cross-sectional design precludes causal inferences about how satisfaction evolves with prolonged service use. Fourth, self-reported measures of digital anxiety may conflate trait-level anxiety with situational discomfort, warranting behavioural or experimental validation.*

Managerial implications. *To enhance satisfaction in digital public services, managers must prioritise technical performance-ensuring interfaces are intuitive, transactions error-free, and services delivered promptly-as these elements universally drive user satisfaction. For digitally anxious populations, pair these technical improvements with trust-building measures such as transparent communication about data use and step-by-step guidance to reduce barriers. In general, the strategies implemented may depend on user readiness: simplify interfaces for high-anxiety groups while offering advanced features for confident users.*

Originality of the paper. *This study contributes to the e-government literature by integrating trust in public actors and digital anxiety into the analysis of service satisfaction-a novel approach that highlights the interplay between relational and technical dimensions of public service delivery. Unlike prior frameworks focusing solely on functional quality, we demonstrate that institutional trust mediates satisfaction and that users' digital anxiety moderates its role. For high-anxiety individuals, trust acts as a compensatory mechanism, mitigating technological discomfort; for low-anxiety users, satisfaction hinges predominantly on service performance. By methodologically distinguishing trust in public institutions (a relational construct) from service quality (a technical construct), we offer a dual-path perspective where satisfaction arises from both operational excellence and citizen-state rapport. This approach advances a more nuanced understanding of digital governance, providing policymakers insights to address equity gaps in digitisation efforts.*

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Empowering Consumers in Participatory Pricing: a Comparative Analysis of Pay-What-You-Want and "Choose a Price" Models and Their Impact on Consumers' Willingness to Co-Create Value

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Abstract

Participatory pricing challenges traditional firm-controlled pricing by involving consumers in the price-setting process. Among these models, Pay-What-You-Want (PWYW) gives consumers full autonomy to set the price, while variations like The Ordinary's "Choose a Price" campaign introduce some brand control, offering a novel take on PWYW. While much research has focused on the financial and behavioral aspects of participatory pricing, its impact on non-financial outcomes like value co-creation and differences in financial results between model variations has been less explored. Therefore, this study aims to investigate how different co-pricing models influence financial outcomes and the relationship between willingness to pay and value co-creation. For this purpose, a quantitative online survey involving 791 subjects is being conducted to compare the effects of Pay-What-You-Want and "Choose a Price" pricing models on both price decision and value co-creation using The Ordinary as case study. Preliminary results show similar willingness to engage in value co-creation across both models. However, in terms of financial outcomes, most participants in the PWYW model paid more than the original price, while those in the "Choose a Price" model mostly opted for the highest discount. Thus, while the willingness to co-create value is similar in both models, traditional PWYW leads to better financial results. This suggests that given similar results in consumer willingness to co-create value, managers may favor the PWYW model in the short term to maximize revenue.

Framing of the research. *Pricing has traditionally been considered one of the most critical elements of marketing strategy, playing a central role in consumer decision-making, brand positioning, and perceived value creation (Monroe, 1973; Zeithaml, 1988).*

Conventional pricing approaches are rooted in the Goods-Dominant Logic (G-D Logic), which assumes that firms are the sole creators of value, embedding it within products and services before exchange (Vargo and Lusch, 2004). However, the shift toward a Service-Dominant Logic (S-D Logic) has challenged this perspective, positioning value as something co-created through interactions between firms and consumers with both sharing knowledge and experiences rather than being unilaterally determined by the company (Vargo and Lusch, 2008). This conceptual evolution has further reinforced the recognition of consumers as increasingly empowered and actively involved in decision-making processes, leading to the emergence of participatory pricing models in which they play a direct role in price determination. One of the most widely studied participatory pricing model is the "Pay-What-You-Want" (PWYW), also referred to as "Name-Your-Own-Price" (NYOP) (Fay, 2004), "Pay-What-You-Like" (PWYL) (Fernandez and Nahata, 2009) or "Pay What You Can" (Saccardo et al., 2015). This model grants customers the freedom to pay any price they consider appropriate-including nothing- without the seller being able to oppose it (Kim et al., 2009).

The PWYW model has long existed in various cultural and religious contexts. For example, in Indian villages, priests and rural doctors receive compensation based on what patrons can afford (Fernandez & Nahata, 2009). Similarly, nonprofit organizations have traditionally relied on discretionary payments, such as voluntary contributions in religious institutions, which exemplify a long-standing tradition of this approach (Christopher & Machado, 2019; Fernandez & Nahata, 2009). Beyond the nonprofit sector, early forms of PWYW have emerged in for-profit contexts, particularly in cause-related marketing, where consumers can voluntarily decide the additional amount to pay-on top of the set product price-to support philanthropic causes (Gneezy et al., 2010).

However, the model has also gained traction in purely commercial settings. Thus, although the Pay-What-You-Want pricing mechanism is classified as a variant of the "voluntary market payment mechanism" (Natter and Kaufmann, 2015), in this case it differs from other "honor system" models, such as donations or tipping (Gerpott, 2016), in that customers are not contributing for the benefit of others but rather determining the price of their own consumption (Jung et al., 2014).

The commercial relevance of the PWYW model emerged when businesses began experimenting it in sectors such as entertainment, media, and dining receiving positive outcomes. A notable example is the band Radiohead, which, in 2007, offered their album In Rainbows under a 'Pay What You Want' scheme, achieving satisfactory results compared to the performance of previous releases with fixed prices (Schmidt et al., 2015).

Subsequently, academic research also began to examine the PWYW model, providing empirical evidence of its advantages, such as market penetration, its role as a short-term promotional tool (Christopher & Machado, 2019),

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additional opportunities for seller differentiation, and its positive impact on credibility and perceived fairness (Kim et al., 2009).

However, due to its inherent characteristics, the model has raised several questions regarding its economic viability and the behavioral drivers that enable PWYW to yield positive outcomes (Fernandez & Nahata, 2009).

First, various studies highlight the influence of behavioral factors on the willingness to pay more than zero in a PWYW context and, at times, even more than the price the product would have had under a fixed pricing scheme, challenging the dominant perspective in economic theory that purchasing decisions are primarily rational and driven by utility maximization through a trade-off between costs and benefits (Roy, 2015; Gneezy et al., 2010; Kim et al., 2009).

Indeed, Kim et al. (2009) tested the PWYW pricing model across three different contexts and found that more fair-minded and satisfied consumers tend to pay more, while those with higher price consciousness or lower incomes tend to pay less. Narwal and Nayak (2020) observed that consumers primarily rely on external reference prices-such as similar products or competitor pricing-as benchmarks rather than past purchase experiences (internal reference prices). Similarly, Roy et al. (2021) found that in the absence of an external reference price, consumers anchor their payments on their internal reference price. Their study also highlighted the role of social desirability, showing that the presence of others encourages consumers to pay at least as much as their internal reference price. On the same line, Rabbanee et al. (2022) also found that social desirability can overcome the effect of price consciousness on price decisions in PWYW contexts, as even consumers who are price-conscious and seek the best deals may choose to pay more in order to appear more generous and socially responsible in front of others and so also preserving their social image (Gneezy et al., 2012).

However, behavioral aspects that can contribute to positive outcomes in the PWYW context do not seem to be universally applicable to all market contexts. The sustainability of PWYW model depends on several factors, including market conditions, product type, and consumer demographics (Gerpott, 2016). Empirical evidence suggests that PWYW is more successful for low-cost, experience-based goods and services, such as digital products, dining, and entertainment (Kim et al., 2014; León et al., 2012). Schmidt et al. (2015) noted that the PWYW pricing model is more effective for small businesses or non-profit organizations than for large corporations. They also suggested that this model may be ineffective in highly competitive markets, particularly when fixed-price sellers are present, as their study found that consumers tend to prefer fixed prices over the PWYW model. In contrast, while Chen et al. (2017) agree with Schmidt et al. (2015) that PWYW is most suitable for products with low marginal costs, such as cultural events or digital goods, they argue that it can also be advantageous in highly competitive markets. Their findings suggest that in perfectly competitive markets, firms tend to set prices close to marginal costs, leading to zero economic profits. In contrast, companies adopting the PWYW model may avoid this pricing pressure, shifting competition toward factors other than price

Thus, apart from the analysis of behavioral aspects and economic viability, limited research has focused on the non-monetary consequences of PWYW for both firm and customers (Gerpott, 2016) such as value co-creation. Participatory pricing aligns with the principles of value co-creation, emphasizing that consumers do not passively accept value propositions but actively contribute to shaping their experiences with brands (Prahalad and Ramaswamy, 2004). By involving consumers in price-setting, participatory pricing fosters engagement, enhances trust, and strengthens the relationship between brands and consumers (Machado and Sinha, 2013). Therefore, since both PWYW and value co-creation emphasize capturing value for customers, we assume that they are inherently compatible (Read et al., 2019).

To date, only Lin and Souma (2024) conducted an online experiment to explore whether the PWYW experience for acquiring New Age music enhances customers' sense of empowerment and subsequently increases their willingness to pay (WTP) - understood as the maximum amount of money an individual is willing to spend to obtain a given product or service (Krishna, 1991) - and their inclination toward value co-creation. The results indicated that customers who made higher payments in the PWYW condition experienced an increase in self-efficacy, which in turn made them more likely to engage in value co-creation activities with the service provider.

However, despite these insights, a gap remains in the literature regarding the relationship between participatory pricing and consumers' willingness to engage in the co-creation process, particularly in relation to the emerging variations of the PWYW model. This lack of research leaves uncertainty about the actual potential of PWYW and its variants as a catalyst for value co-creation.

Purpose of the paper. *This study aims to fill a gap in the existing literature by first examining whether there are differences in consumers' WTP between the PWYW model and the case-based variation "Choose a Price", introduced by the brand The Ordinary. In the PWYW model, where consumers are free to set their own price, WTP emerges through a self-regulated adjustment process in which individuals settle on a price they perceive as satisfactory in relation to the perceived value of the offering (Narwal and Nayak, 2020). By contrast, in the "Choose a Price" model, WTP is expressed within a predefined pricing framework, typically consisting of three fixed discount options applied to the full price of one of the brand's products. Consumers are invited to select one of these options, reflecting their perceived value of the offering. The use of percentage-based price discounts is a well-established strategy employed by sellers to enhance both purchase likelihood and product attractiveness (Wang et al., 2025). However, prior research has shown that small discounts, compared to fixed prices, may increase consumers' price sensitivity, emphasizing economic sacrifice and reducing overall perceived value, whereas higher discounts can lower the sense of sacrifice and enhance value perception (Suri et al., 2000). Therefore, in the "Choose a Price" scenario, the presence of increasingly higher discount percentages may encourage consumers to opt for the highest available discount, in contrast to the classic PWYW model, where empirical evidence has demonstrated that, in several cases, consumers voluntarily choose to pay a price higher than what*

they would have paid under a fixed-price condition. Nevertheless, the attractiveness of a higher discount percentage could suggest that the brand's primary objective extends beyond direct financial outcomes.
Therefore, after identifying potential differences in the WTP under the two conditions (PWYW and Choose a Price), this study further examines how these differences impact consumers' willingness to co-create value. Specifically, it explores whether granting complete freedom in price determination or implementing a partially constrained pricing mechanism leads to different outcomes in terms of value co-creation.

Methodology.

The Ordinary's "Choose a Price" campaign

The skincare brand The Ordinary–now fully owned by Estée Lauder (ilSole24ore, 2024) –has disrupted the beauty industry by prioritizing transparency and consumer education over traditional branding and aspirational marketing (Theordinary.com). Since its launch in 2016, the brand has empowered consumers with clear, accessible product information, fostering an engaged community that actively contributes to its evolution.

This commitment to co-creation extends to pricing strategies, as demonstrated by the 2024 Choose a Price campaign. The brand proposed a specific variation of the PWYW model, where the price selection is not entirely free, but consumers could freely choose from three different discount levels (0%, 23%, and 40% off) for the The Daily Set. This approach represents an innovation in the participative pricing model framing, where the brand's control is not exercised through price suggestions or the definition of a minimum price, but rather by predetermining the available discount levels. By allowing customers to select from these predefined options, the initiative reinforced The Ordinary's reliance on its community, framing pricing as a participatory decision. This strategy exemplifies how the brand integrates consumer engagement into multiple aspects of its business, positioning its audience as active contributors rather than passive buyers.

Questionnaire design

This study employed a quantitative analysis through an online questionnaire administered via Qualtrics. Participants were selected using a discriminant criterion to include only those familiar with the brand The Ordinary. This was achieved using the skip logic feature of Qualtrics, which excluded respondents indicating unfamiliarity with the brand from further participation. This allowed us, in this first phase of analysis, to focus exclusively on participants who, being familiar with the brand and its products, can make a more informed judgment regarding the price they are willing to pay. In contrast, those unfamiliar with the brand may base their pricing judgment on factors such as the packaging or other cues, which are less reliable compared to personal experience with the brand and its products. This distinction ensures that the price evaluation is more grounded for those with direct knowledge of the brand.

The sample we have analyzed so far consists of 791 individuals, with an average age of 28 years, of whom 96.84% were women.

To familiarize participants with the subject of the study, they were presented with The Daily Set, the product featured in the "Choose a Price" campaign. The product was displayed as it appears on the official e-commerce site of The Ordinary, with all its information except the price.

The questionnaire was structured into two main sections:

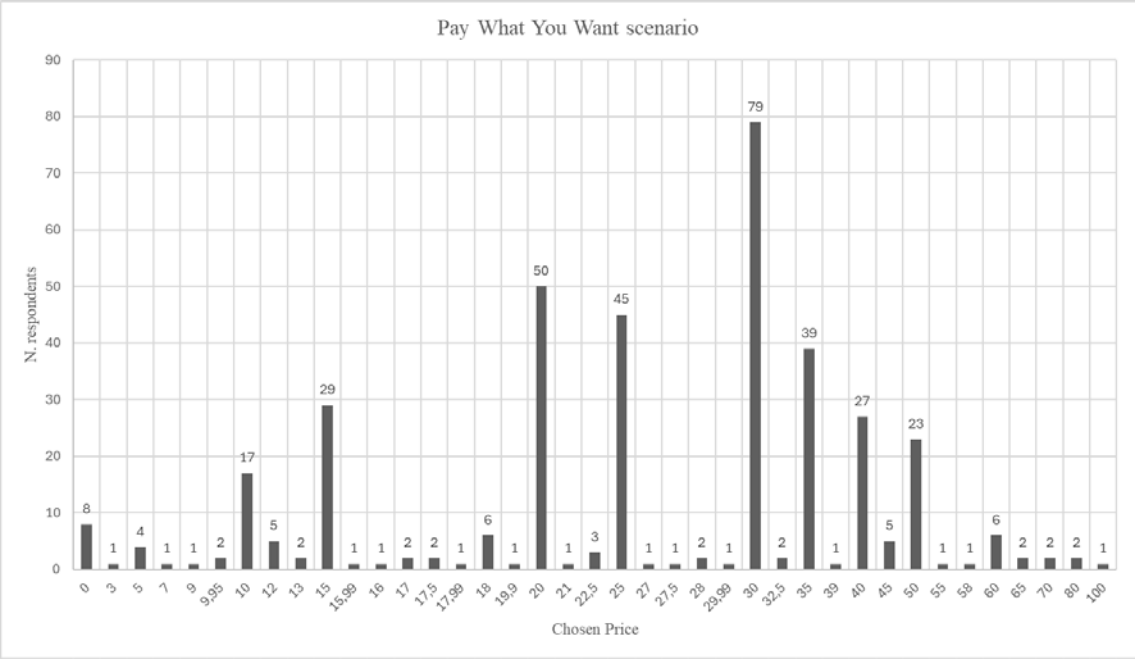
1. ***Willingness-to-Pay Assessment:*** *Participants were randomly assigned to one of two experimental conditions using the automatic randomization feature in Qualtrics. Each group was presented with a distinct pricing scenario:*
   - ***Pay What You Want (PWYW) Model:*** *Participants in this group (n = 378) received the following open-ended prompt:*
     "Imagine you have to purchase this set of products in euros. The Ordinary has created a system that allows you to freely choose the price to pay, even €0. How much do you decide to pay for the set of products?"
   - ***Predetermined Price Options Model (Choose a Price):*** *Participants in this group (n = 413) were presented with the following multiple-choice scenario:*
     "Imagine you have to purchase this set of products in euros. The Ordinary has created a system with three different price bands, leaving you with the choice of how much to pay for the set among the proposed prices. The options are:
     - *Full price: €22.60*
     - *23% discount: €17.40*
     - *40% discount: €13.56*
     - *Which one do you choose to pay?"*
2. ***Perceived Value Co-creation Assessment:*** *in the second section, participants were asked to evaluate their propensity to engage in value co-creation. The questions in this section were linked to the pricing scenario previously assigned to each respondent, ensuring consistency between their pricing decision and their co-creation attitudes. To evaluate the level of perceived value co-creation, nine questions were posed using the scale from the experiment by Lin and Souma (2024), appropriately adapted for this study. The sole exception in the scale used in the following experiment is question no. 3, whose reference was adapted from Sarmah et al. (2017). The questions aim to capture key*

dimensions of customer engagement in co-creation: collaboration for brand improvement, intrinsic and extrinsic motivations for engagement and positive word-of-mouth and advocacy.

The response options were presented on a 5-point Likert scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree).

Results. *The data collected from the web survey provided an initial overview of purchasing behavior across the two pricing scenarios. In the PWYW scenario, certain price points emerged as more frequently selected. Specifically, as shown in Figure 1, €30 was the most chosen price, selected by 79 participants, followed by €20 and €25. The mean amount that respondents were willing to pay in this condition was €28.14, exceeding the original price of the product by €5.54. In summary, 64% of participants opted for a price higher than the original product's fixed price (€22,60), while 36% selected a lower price.*

Fig. 1: Frequency of price choices in the Pay What You Want scenario.



Source: authors' elaboration

In contrast, as represented in Figure 2, the "Choose a Price" scenario shows a distinct rational consumer behavior pattern, where 54% of participants opted for the maximum discount option (40% off), 35% chose the intermediate price with the lowest discount (23% off), and only 11% selected the full-price option without any discounts. This distribution resulted in an average payment of €15,89, highlighting a significant divergence between the two scenarios.

Fig. 2: Frequency of price option choices in the Choose a Price scenario.

Source: authors' elaboration

Following the consumers' WTP analysis in the two conditions, we examined the willingness to co-create value with the brand The Ordinary. In the PWYW scenario, the segment of respondents who were willing to pay more than €22,60

exhibited an average co-creation level of 3,98, while those who were willing to pay less had an average of 4,01. In the Choose a Price scenario, the average co-creation scores were 4.03 for the €13.56 option, 3.93 for €17.40, and 3.98 for €22.60.

Overall, these preliminary findings suggest that willingness to co-create does not significantly differ between the two co-pricing mechanisms. Although minor variations are observed, no consistent pattern emerges that would suggest a strong relationship between pricing strategy and consumer engagement in co-creation. Future developments of this paper should include more robust statistical analyses to more reliably assess the presence or absence of statistically significant differences.

Research limitations. *While this study provides valuable insights into participatory pricing and its role in value co-creation, several limitations must be acknowledged.*

First, the sample consists primarily of Italians participants, which may limit the generalizability of the findings to other populations with different cultural contexts or economic environments. Therefore, future research developments could benefit from including more diverse samples encompassing different countries, regions, or cultural backgrounds to assess whether the findings are consistent across various consumer segments. Moreover, the findings from this initial exploratory phase are based solely on descriptive analysis; therefore, future developments of the study should incorporate more in-depth statistical testing to validate and deepen the insights obtained.

Second, the study is focused on a specific brand, which further limits the external validity of the results. The relationship between consumers and the brand studied in this research may not fully reflect the dynamics observed in other industries or product categories.

Managerial implications. *Our preliminary findings suggest a fundamental difference in consumer behavior between the two types of participatory pricing analyzed. In the Choose a Price condition, the presence of greater brand control and discounts that constrained price-setting freedom led most participants to adopt a rational decision-making approach, prioritizing the most cost-effective option. This outcome could align with traditional economic theories, which suggest that when faced with predefined price tiers, consumers tend to maximize their financial benefit by selecting the lowest available price (Roy et al., 2016). Additionally, these results could confirm the position of Suri et al. (2000), who argue that discounts increase consumers' price sensitivity and highlight economic sacrifice, potentially leading to a lower perceived value of the offer.*

Conversely, in the PWYW scenario, slightly more than half of the participants was willing to pay a price higher than the predetermined fixed price for the analyzed product. Therefore, pricing decisions in this context appear to be influenced by factors beyond purely rational economic considerations, confirming previous research findings (e.g., Roy, 2015; Kim et al., 2009). Furthermore, our initial results align with those obtained by Kim, Natter, and Spann (2014), who found that PWYW yielded better financial performances compared to discount-based promotions. Our findings extend this insight by demonstrating that even allowing consumers to freely choose their discount level leads to inferior results compared to the classic PWYW model.

An additional key insight from our comparison comes from the propensity of consumers to engage in value co-creation activities, which was found to be consistently high across both analyzed co-pricing strategies. In the PWYW model, observing that consumers who are willing to pay more also exhibit a high willingness to co-create value is not surprising, as it aligns with previous empirical evidence (e.g., Lin and Souma, 2024), which suggests that increased consumer confidence and empowerment foster value co-creation behaviors. However, what is particularly interesting is that in both the PWYW model and Choose a Price, those who were willing to pay less still demonstrated a likelihood to co-create value comparable to those who paid more.

According to PWYW literature, one of the primary reasons why consumers choose to pay more than zero is related to perceived fairness and reciprocity in social exchanges (Roy, 2015; Kim et al., 2009). Consumers recognize the value of price-setting freedom and feel a moral obligation to reciprocate the benefit received by paying what they consider a fair price (Narwal and Rai, 2022). Kim et al. (2009) further support this idea, stating that in PWYW settings, buyers are expected to financially reward the seller for the product/service received. Therefore, one possible explanation for our preliminary findings is that, for some customers, The Ordinary's offer may have had a lower perceived monetary value than their usual reference price for the analyzed product. Alternatively, consumers who were willing to pay less than the base price may have still reciprocated the brand in non-monetary ways, in line with the principles of reciprocity and Equity Theory. These compensatory actions could manifest as value co-creation behaviors, as suggested by our preliminary results.

Moreover, based on our preliminary findings, we recommend that managers prioritize the classic PWYW model over the Choose a Price case-based variation, as it yields better economic performances while achieving the same effect in enhancing consumers' willingness to co-create value.

Additionally, with regard to the value-informed pricing which relies on capturing the monetary equivalent of the co-created value, Ingenbleek et al. (2014) argues that one of the key challenges remains understanding how consumers perceive value and translating it into an appropriate monetary expression. In line with this, Kim et al. (2009) suggest that PWYW can serve as an indicator of perceived quality, as consumers tend to align their payments with their evaluation of the product or service. Therefore, building on our preliminary findings we could propose that managers leverage the PWYW model as a promotional tool which, by capitalizing on its entertainment factor (Kim, Natter, and Spann, 2014) and its ability to enhance consumers' self-efficacy (Lin and Souma, 2024), could effectively reveal the perceived value of

a brand's offering while simultaneously fostering greater consumer engagement in co-creation activities. However, given that the long-term sustainability of the PWYW model depends on several factors-such as high levels of consumer loyalty, satisfaction, and fairness (Kim et al., 2009) -as well as the significant risks associated with its failure, including the inability to cover costs, unintended brand positioning, and erosion of corporate image (Balan, 2014), we suggest that this potential function of PWYW, should be strategically applied periodically through time-limited initiatives. This would help establish a virtuous cycle in which managers gain actionable insights into consumers' value perceptions-emerging from their co-creation process-allowing for the refinement of pricing strategies and ultimately supporting more effective compensation across the company's value network.

Originality of the paper. *First, this study contributes to the existing literature on participatory pricing models in several ways. First, it introduces a new variation of the PWYW model that has emerged from a context-specific marketing practice-"Choose a Price"- by the brand The Ordinary, in which consumers' freedom of choice is constrained through predefined discount levels. Second, it directly compares the financial performance of the classic PWYW model with its Choose a Price variation under identical conditions.*

Additionally, preliminary findings of this research expand the literature by offering a new perspective on how participatory pricing models could enhance consumers' willingness to engage in value co-creation activities. The findings demonstrate that there are no significant differences between the two models in terms of their impact on co-creation willingness. In both cases, consumers exhibit a high willingness to participate in value co-creation processes, thereby reinforcing the conclusions of Lin and Souma (2024), who found that participatory pricing mechanisms increase consumers' propensity for value co-creation. Moreover, this paper introduces the possibility of considering co-pricing models as a tool for implementing value-informed pricing (Ingenbleek et al., 2014), suggesting a new avenue for future research to explore and validate.

Key words: *Participative Pricing; Pay-What-You-Want; Value Co-Creation; Service-Dominant Logic*

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The use of PLS-SEM by the Italian management scholars' community: An updated review and some guidelines

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Abstract

Partial least squares structural equation modeling (PLS-SEM) is a component-based structural equation modeling (SEM) technique that has gained prominence internationally in management studies. However, a comprehensive review of PLS-SEM's use by Italian management scholars is not yet available. This research aims to fill this gap by reviewing the articles published by Italian scholars until the end of 2024 to identify current practices and areas for improvement. We analyze 140 PLS-SEM studies published by Italian management scholars covering four aspects: (1) reasons for using PLS-SEM, (2) sample and model characteristics, (3) structural model evaluation, and (4) advanced analysis techniques. The findings show that 106 of the 140 studies have been published in the 2022-2024 period, suggesting that PLS-SEM is gaining popularity among Italian management scholars. At the same time, the results show that researchers can benefit from the use of advanced PLS-SEM techniques in their studies. We make various suggestions based on our analyses.

Key words: *Research methods; Management studies; Structural equation modeling; PLS-SEM; Partial least squares structural equation modeling*

Framing of the research. *Partial least squares structural equation modeling (PLS-SEM) is a component-based structural equation modeling (SEM) technique that has recently experienced wide popularity. The bibliometric literature review published by Angelelli et al. (2025) identified 9,150 documents indexed in the Web of Science Core Collection database in the 1985-2022 period. Interestingly, more than 50% of these documents (n=3,931) have been published in the two most recent reviewed years (2021-2022), revealing an exponential adoption of this technique. Moreover, the "Business & Economics" research area accounted for the highest share (i.e., 40%) of the retrieved documents. In particular, several analyses indicate the growing importance of PLS-SEM in the management field and its sub-fields, including, among others, marketing (Guenther et al., 2023; Sarstedt et al., 2022), quality management (Magno et al., 2024), family business (Hair et al., 2021), and international business (Richter et al., 2022). Methodological studies are rapidly advancing and refining PLS-SEM, resulting in new opportunities and guidelines (Becker et al., 2023; Sarstedt et al., 2023). Hence, researchers interested in applying this method need to align their studies with the most recent advancements to enhance the rigor, relevance, and transparency of their research findings (Adler et al., 2023).*

Purpose of the paper. *In 2020, the first Italian version (Hair et al., 2020b) of the highly cited textbook on PLS-SEM (Hair et al., 2014; Hair et al., 2017; Hair et al., 2022) was published, which represented an additional opportunity for the Italian management scholars' community to approach PLS-SEM. However, a comprehensive review of PLS-SEM's use by Italian management scholars is not yet available. This research aims to fill this gap by reviewing the PLS-SEM articles published by Italian scholars until the end of 2024 to identify current practices and areas for improvement. The findings of this analysis can thus offer an opportunity for collective updating of PLS-SEM applications to the most recent methodological advancements.*

Methodology. *We followed the procedure outlined in Figure 1 to perform our review. First, we ran a search of Elsevier's Scopus database[3] (last update: 15th March 2024), resulting in 272 articles that met all the following criteria:*

- *search keywords: "PLS-SEM" or "partial least squares";*
- *year: until 2024 (included);*
- *subject area: "Business, Management and Accounting";*
- *country/territory of affiliation of at least one co-author: Italy;*
- *document type: "Article";*
- *language: "English";*

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[3] Query: (TITLE-ABS-KEY ("pls-sem") OR TITLE-ABS-KEY ("partial least squares")) AND PUBYEAR > 1992 AND PUBYEAR < 2025 AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (AFFILCOUNTRY , "Italy")) AND (LIMIT TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (PUBSTAGE , "final"))

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- *publication stage: "final" (i.e., articles "in press" were not included in the review).*

Second, we checked the subject area of each Italian (co)author to ensure that she/he belonged to the scientific sector/discipline "SECS-P/08 or ECON-07/A - Management". For this purpose, we checked the official list of researchers and professors on the website of the Italian Ministry of University and Research.[4] Through this procedure, 125 articles were excluded from the analysis for the following reasons:

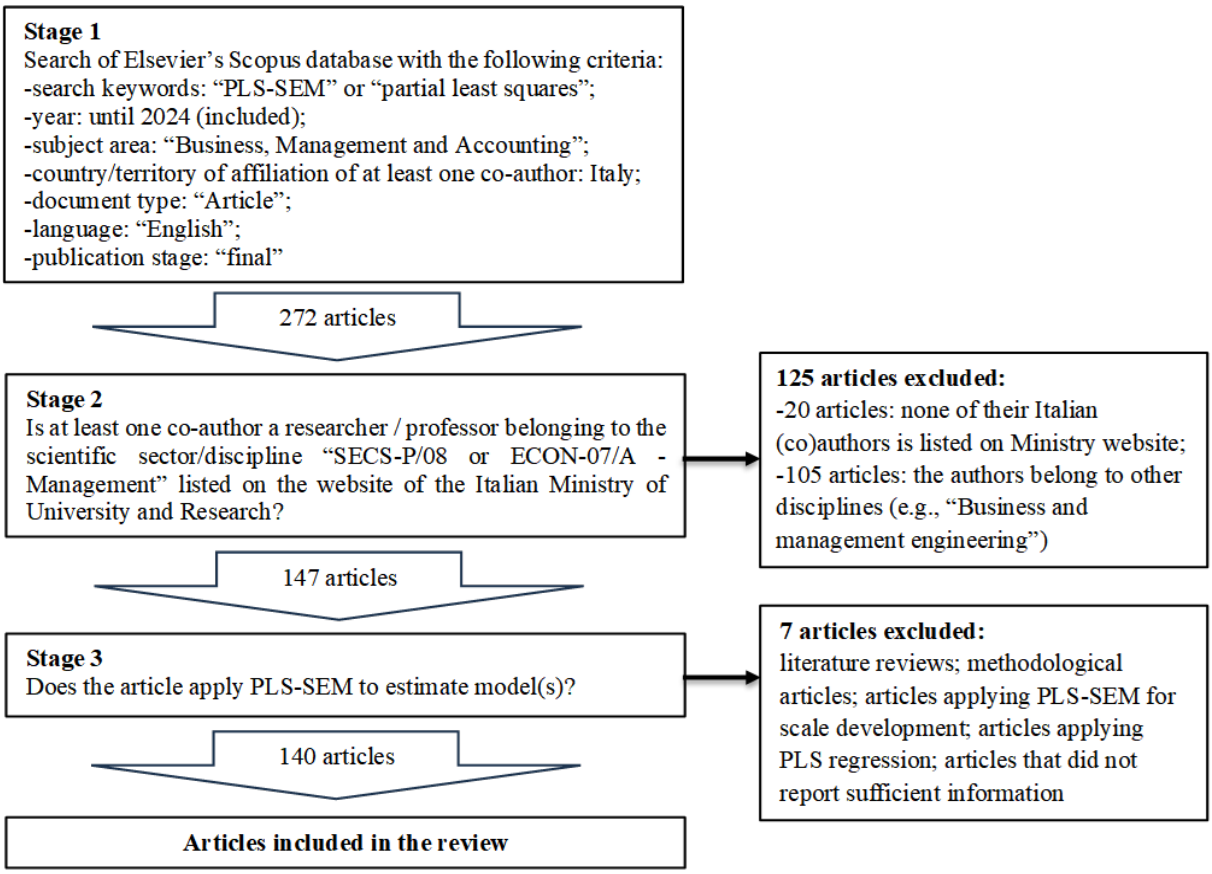
- *20 articles because none of their Italian (co)authors were listed on the Ministry website, neither at the time when the article was published nor in the most recent update of the list (31st December 2024);*
- *105 articles because the authors belonged to other disciplines, including "Business and management engineering", "Agricultural economics", "Accounting", "Economics", "Statistics", and others.*

Third, we considered only articles that applied PLS-SEM for estimating models, and therefore we excluded 7 articles for the following reasons: one article contained a literature review (Magno et al., 2024); one was a methodological article

(Kurtaliqi et al., 2024); two articles applied PLS-SEM for scale development (Corsaro and Maggioni, 2022; Merz et al., 2018). Finally, one article contained a PLS regression and two articles did not report sufficient information for our analysis. Overall, 140 articles and 145 models (some articles included more than one model) were considered in the review.

Consistent with previous reviews of PLS-SEM studies (Sarstedt et al., 2022), this study covered four aspects: (1) reasons for using PLS-SEM, (2) sample and model characteristics, (3) structural model evaluation, and (4) advanced analysis techniques.

Fig. 1: Article search and selection



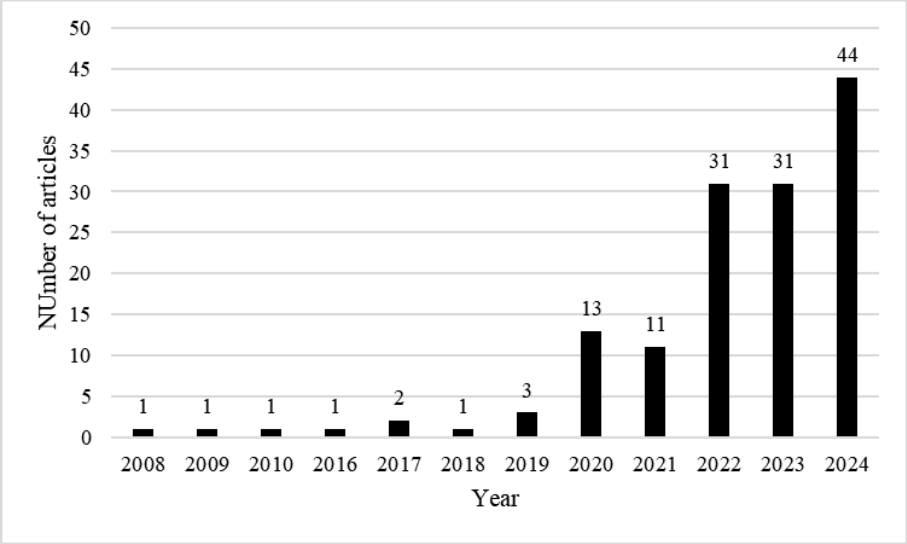
Source: our elaboration.

Results. *The analysis revealed that 106 of the 140 articles have been published in the 2022-2024 period (Figure 2), thus suggesting that, even if later compared to the international context (Angelelli et al., 2025), PLS-SEM is now being rapidly adopted by the Italian management scholars' community.*

The journals hosting the highest number of reviewed studies were: Journal of Knowledge Management (n=11); Technological Forecasting and Social Change (n=9); Journal of Cleaner Production (n=8); Business Strategy and the Environment (n=6); Journal of Business Research (n=6); Sinergie Italian Journal of Management (n=6).

[4] https://cercauniversita.mur.gov.it/php5/docenti/cerca.php

Fig. 2: PLS-SEM applications by the Italian management scholars' community



Source: our elaboration.

(1) Reasons for using PLS-SEM

The analysis (Table 1) shows that nonnormal data is the most frequently mentioned reason (n=36) to motivate the use of PLS-SEM, followed by theory development and exploratory research (n=30). Interestingly, the predictive and causal-predictive study focus, which should be a core aspect of PLS-SEM studies (Sarstedt et al., 2023), is mentioned in 29 studies. A remarkable number of studies (n=32) do not indicate a specific reason for using PLS-SEM.

Tab. 1: Reasons for using PLS-SEM

Reasons	Number of studies (*n*=140)
Nonnormal data	36
Theory development and exploratory research	30
Predictive (and causal-predictive) study focus	29
Small sample size	24
High model complexity	24
Explain variance in the endogenous constructs	13
Formative measures	10
PLS-SEM's popularity and standard use in the field	7
Higher-order constructs	7
Mediation effects	5
Latent score availability	5
Other reasons (e.g., theory testing, moderation effects, higher statistical power than CB-SEM; multi-group analysis)	30
No explicit reason	32

Source: our elaboration.

(2) Sample and model characteristics

Our analysis of the 145 models reveals an average of 5.94 latent variables and an average of 8.06 path relationships (Table 2), indicating quite simple structural models (Sarstedt et al., 2022). At the same time, more than 50% of the models (n=79) include mediation effects, and 31 models include interaction effects. A remarkable number of models (n=42) encompass higher-order constructs, with a higher presence of reflective-reflective (n=13) and reflective-formative (n=13) models. However, the approach for specifying and estimating higher-order constructs is not reported for half of the cases (n=21). Moreover, only 10 of the 42 higher-order constructs are evaluated using criteria documented in the extant literature. Hence, it would be important to adhere to the established guidelines for higher-order constructs' specification, estimation, and validation (Sarstedt et al., 2019).

Tab. 2: Model characteristics

Criterion	Results (*n*=145)
Sample size	
Mean	368.34
Median	300
Range	(38;3574)
Number of latent variables	
Mean	5.94
Median	6.00
Range	(3; 11)
Number of inner model path relations	
Mean	8.06
Median	7.00
Range	(2; 27)
Measurement model (first-order)	
Only reflective	131
Only formative	2
Reflective and formative	10
Not specified	1
Total number of indicators in models	
Mean	30.97
Median	30.00
Range	(6; 80)
Number of models with single-item constructs	18
Number of models with control variables	36
Number of models with mediation effects	79
Number of models with interaction effects	31
Number of models with nonlinear relationships	1
Number of models with higher-order constructs	42
Type of second-order constructs	
Type I (reflective-reflective)	13
Type II (reflective-formative)	13
Type III (formative-reflective)	0
Type IV (formative-formative)	1
Both types I and II	1
Not specified	14
Specification and estimation of higher-order constructs	
Repeated indicators approach	6
Two-stage approach	15
Not specified	21
Evaluation of higher-order constructs	
Use of criteria documented in the extant literature	10
Missing evaluation of higher-order constructs	23
Incomplete application of relevant criteria	9
Misapplication of evaluation criteria	0

Source: our elaboration.

(3) Structural model evaluation

Table 3 shows the findings for the evaluation of the structural model, which includes the model's explanatory and predictive accuracy. The values of their path coefficients and the level of significance are reported for almost all models. Similarly, the coefficient of determination is shown for the vast majority of models (n=124), thus providing information about the explanatory power of the models. Regarding predictive relevance, almost half of the models (n=69) apply Q^2 based on the blindfolding routine. Nonetheless, the current PLS-SEM guidelines recommend the use of the PLSpredict algorithm and the CVPAT (Sarstedt et al., 2023; Sharma et al., 2023; Shmueli et al., 2019). The analysis indicates that only 15 studies have implemented such procedures.

Tab. 3: Structural model evaluation

Criterion	Empirical test criterion in PLS-SEM	Number of models (*n*=145)
Path coefficients	Values	144
Significance of path coefficients	Standard errors, significance levels, t values / p values	143
Effect size	f^2	42
Explanatory power	R^2	124
Model fit	GoF, SRMR, etc.	53
Predictive relevance (blindfolding)	Q^2	69
	q^2	4
Predictive power	$PLS_{predict}$	11
	CVPAT	4
Predictive model comparison	BIC, GM, CVPAT	1

Source: our elaboration.

(4) Advanced analysis techniques.

Gudergan et al. (2025) provide an overview of the wide variety of established advanced PLS-SEM methods in their Table 1, which makes the method particularly useful for research projects and studies. The application of advanced techniques in the articles we reviewed is still quite limited. The analysis showed that multi-group analysis was applied for 25 models, but in 13 models, the needed measurement invariance tests had not been executed (Chin and Dibbern, 2010; Hair et al., 2024). A smaller number of studies applied the following advanced techniques: importance-performance map analysis (n=8) (Ringle and Sarstedt, 2016); Necessary condition analysis (n=5) (Richter et al., 2023); Endogeneity assessment (n=2) (Cheah et al., 2024; Liengaard et al., 2025); Confirmatory composite analysis (n=1) (Hair et al., 2020a). Advanced techniques such as the combined importance-performance map analysis (cIPMA; Sarstedt et al., 2024) have not been applied yet.

Research limitations. *The criteria applied to retrieve articles may have excluded articles that used PLS-SEM but did not reflect their use in the title, abstract or keywords. Moreover, we did not analyze the "in press" articles, which were 28 at the time we executed our search. In addition, given the space constraints, in this study, we reported only a part of the detailed information we collected on the reviewed articles.*

Managerial implications. *The findings indicate several avenues for researchers interested in applying PLS-SEM in their management studies such as: it is important to provide not only an evaluation of the explanatory power of the model but also of its predictive accuracy using the PLSpredict algorithm and the CVPAT; the guidelines provided by Hair et al. (2024, chapter 2) should be applied in modeling higher-order constructs; multi-group analysis is a valuable technique but requires measurement invariance assessment to provide solid outcomes; there are many opportunities to apply PLS-SEM more sophisticated techniques in management research. Moreover, PLS-SEM can also be valuable in deriving strong practical implications from management studies (for example, by using the IPMA).*

Originality of the paper. *This is the first study to provide a comprehensive review of PLS-SEM's use by Italian management scholars. Its findings can represent an opportunity for collective learning toward enhanced use of PLS-SEM and its extensions.*

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Track 7
Purpose-driven Businesses

Sostenibilità e Creazione di Valore Condiviso: il Contributo degli Incubatori nella Generazione dell'Impatto

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Abstract

Gli incubatori sociali possono offrire un importante contributo nel supportare le imprese a impatto sociale e ambientale. Ciononostante, la letteratura attuale dedica ancora poca attenzione a questo tema. Il presente studio si pone come obiettivo quello di analizzare l'operatività degli incubatori attenti alla generazione dell'impatto, identificando le attività chiave che consentono alle imprese incubate dedite all'impatto di superare gli ostacoli alla crescita. Nel fare questo, lo studio utilizza un approccio qualitativo al fine di esaminare le dinamiche che sussistono tra gli incubatori e le imprese dedite all'impatto sociale. Pertanto, sono state condotte interviste in profondità con gli incubatori e gli acceleratori distribuiti lungo il territorio italiano, identificando, per ciascuna barriera alla crescita, una rispettiva soluzione. Queste soluzioni rappresentano il contributo che gli incubatori e gli acceleratori possono offrire per favorire la crescita delle imprese dedite all'impatto sociale, garantendo di conseguenza un più ampio impatto. I risultati finora ottenuti mostrano che gli incubatori attenti all'impatto offrono soluzioni reali alle barriere alla crescita, a partire dalle attività di coaching e mentoring, passando per il networking e le attività di finanziamento. I risultati forniscono indicazioni pratiche ai manager degli incubatori e ai policymaker su come strutturare modelli di business efficaci, in modo tale da stimolare il dialogo tra attori dell'ecosistema e società incubate. Questo studio contribuisce alla letteratura esistente offrendo un'analisi dell'operatività degli incubatori in chiave di impatto sociale, ambito ancora poco esplorato.

Inquadramento della ricerca. ***Impatto sociale****. Nel corso degli ultimi decenni, è stata rivolta una particolare attenzione al tema dell'impatto sociale. Generalmente, con questo termine si intende l'insieme delle ricadute, di medio e lungo periodo, che si verificano sulla società a seguito di azioni e politiche (Bertani e Fassina, 2019). In ambito aziendale, quando si parla di impatto sociale si fa riferimento ai benefici che le imprese apportano su un territorio, indipendentemente dal fatto che ciò costituisca o meno il core business dell'azienda. L'economia di impatto, infatti, rappresenta il paradigma imprenditoriale e finanziario votato alla creazione simultanea di valore economico e valore sociale (Camera di commercio di Torino, 2022).*

Affinché ci sia impatto, devono essere rispettati i seguenti tre principi (Camera di Commercio di Torino, 2022):

- *Intenzionalità: ci deve essere la volontà di creare valore sociale;*
- *Addizionalità: fa riferimento alle opportunità di impatto sociale derivanti dall'operare in settori sottocapitalizzati, in quanto penalizzati dai tradizionali meccanismi di mercato;*
- *Misurabilità: relativa alla possibilità di applicare dei metodi di valutazione ex ante e misurazione ex post.*

Le imprese a impatto sociale possono contribuire in maniera diretta o indiretta al bene del territorio, affrontando i bisogni sociali che i servizi pubblici o i meccanismi di mercato non riescono ad affrontare. In ogni settore, è possibile operare con l'obiettivo di generare un impatto sociale positivo. Infatti, la dimensione sociale rappresenta un elemento rilevante per permettere alle aziende di stabilire connessioni con il contesto circostante e adottare una prospettiva orientata all'impatto sociale costituisce un importante requisito per essere accolta positivamente nella sua area operativa (Camera di Commercio di Torino, 2022.

Il concetto di impatto sociale è stato centrale nella letteratura della Corporate Social Responibility (CSR), la quale riconosce che le aziende abbiano delle responsabilità nel contribuire positivamente al contesto socioeconomico in cui esse operano (Motilewa et al., 2016). La CSR rappresenta, infatti, l'insieme dei doveri dei dirigenti aziendali di perseguire politiche, prendere decisioni e seguire una condotta che siano desiderabili rispetto agli obiettivi e ai valori della società (Nigro e Petracca, 2016).

Un'evoluzione della CSR è la Creating Shared Value (CSV), che integra direttamente l'impatto sociale nelle strategie aziendali, migliorando contemporaneamente la competitività dell'impresa e le condizioni economico-sociali delle comunità (Porter e Kramer, 2011). Nella fattispecie, con Creating Shared Value si suole intendere l'insieme di "politiche e pratiche operative che migliorano la competitività di un'azienda e contemporaneamente migliorano le condizioni economiche e sociali nella comunità in cui opera" (Porter e Kramer, 2011). A differenza della CSR, la CSV gestisce

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attivamente le esternalità negative (ad esempio l'inquinamento), evitando che le problematiche sociali vengano relegate a questioni periferiche o, peggio ancora, a escluderle dalle strategie aziendali (Porter e Kramer, 2011).

***Barriere alla crescita**. Le imprese che perseguono obiettivi di impatto sociale, come imprese sociali, cooperative sociali, SIAVS, Società Benefit, B Corp (Camera di commercio di Torino, 2022), affrontano barriere alla crescita più complesse rispetto a quelle che potrebbero incontrare imprese a vocazione esclusivamente commerciale (Davies, Chambers e Chambers, 2019). Davies et al. (2019) riconducono le suddette barriere a tre grandi macrocategorie: 1) barriere basate sui valori che comprendono le differenze di valori etici e la filosofia di crescita e principi etici, 2) barriere basate sul modello di business che comprendono la difficoltà di accesso ai finanziamenti e di accesso alle risorse umane, 3) barriere istituzionali che influenzano e sono influenzate da comportamento dei consumatori e norme aziendali tradizionali.*

***Incubatori e acceleratori**. Secondo i principi della CSV, l'imprenditorialità e l'innovazione sono particolarmente stimolati in tutti quegli ambienti dove si concentrano attività innovative e attori chiave, poiché ivi si possono instaurare processi cooperativi, e concentrare saperi, conoscenze e pratiche (Coscarello, 2024). L'innovazione non è un processo isolato, ma è strettamente connesso alle reti di interazioni tra imprese, istituzioni e altri attori sociali. In questo senso, si parla di "ambienti dell'innovazione" o "luoghi dell'innovazione" per riferirsi all'insieme di spazi che stimolano la collaborazione tra gli attori locali e promuovono lo scambio di idee. Si tratta di spazi che abilitano il cambiamento socioeconomico, rendendo i territori più attrattivi e resilienti alle sfide globali (Coscarello, 2024).*

All'interno della tassonomia dei luoghi dell'innovazione, rientrano i cosiddetti incubatori di impresa e sociali (Montanari e Mizzau, 2016b). Con il termine incubatore si suole generalmente intendere un'entità istituzionale che fornisce una gamma di servizi e, talvolta, risorse finanziarie, con lo scopo di assistere le imprese durante le prime fasi del loro ciclo di vita. In questo senso, gli incubatori svolgono un ruolo primario nell'accelerare il processo di costituzione e formazione di un'impresa, aumentandone la probabilità di sopravvivenza nel mercato (Gervasoni e Sattin, 2020). L'attività di accelerazione comprende la progettazione e lo sviluppo di programmi dedicati, i quali possono essere realizzati sia dagli incubatori stessi, sia da entità distinte note come acceleratori in senso stretto.

Diversi rapporti e pubblicazioni scientifici adoperano i termini incubatore e acceleratore in modo intercambiabile, mentre altri li considerano come due concetti distinti. Generalmente, è possibile identificare i seguenti elementi differenziali (Social Innovation Monitor, 2022):

- *La fase di intervento. Gli incubatori offrono servizi più early-stage, mentre gli acceleratori operano su iniziative già sviluppate:*
- *Il tempo di supporto. gli acceleratori sembrano avere un tempo medio di accompagnamento minore degli incubatori;*
- *Livello di operatività. È emerso che nei programmi di accelerazione le imprese accompagnate inizino insieme il percorso, quasi come una classe di studenti, mentre negli incubatori questo sembra non accadere perché le imprese possono entrare con continuità nel programma.*

Poiché entrambe le realtà perseguono l'obiettivo di sostenere l'innovazione imprenditoriale, verranno trattate congiuntamente nel corso dell'analisi.

In termini generali, gli incubatori rientrano tra le istituzioni finalizzate a stimolare e promuovere l'imprenditorialità (Auricchio, Cantamessa, Colombelli, Cullino, Orame e Paolucci, 2014). La gamma di servizi offerta è diversificata, e funzionale agli obiettivi che si propongono. All'interno degli incubatori lavorano manager con competenze che si estendono su tutte le aree funzionali di un'impresa: marketing, finanza, strategia aziendale (Gervasoni e Sattin, 2020). Queste competenze sono necessarie per poter valutare la fattibilità tecnica, economica e finanziaria di un'idea di business e accelerarne il processo di crescita.

Le imprese che riescono a essere selezionate per un programma di incubazione ottengono diversi benefici tangibili, come la possibilità di ottenere informazioni e risorse rilevanti in minor tempo, le economie di scala e di scopo tipiche delle grandi imprese e una rete di contatti fondamentale. Sansone et al. (2020) identificano diverse tipologie di incubatori sulla base del loro interesse alla generazione dell'impatto sociale e ambientale. Secondo tale classificazione, possono essere individuate tre tipologie di incubatori: 1) Business Incubator: 0% di organizzazioni incubate a significativo impatto sociale rispetto al totale; 2) Mixed Incubator: fino al 50% di organizzazioni incubate che sono a significativo impatto sociale rispetto al totale; 3) Social Incubator: più del 50% di organizzazioni incubate che sono a significativo impatto sociale rispetto al totale.

I Mixed Incubator e, in misura ancora maggiore, i Social Incubator si distinguono dagli incubatori generalisti (Business) per l'attenzione prioritaria all'impatto. Questi incubatori supportano le organizzazioni che sviluppano soluzioni innovative e orientate al mercato per affrontare le problematiche sociali. Sansone et al. (2020) evidenziano che i Social Incubator danno particolare rilevanza alle metriche di impatto e alle attività di consulenza in materia di CSR. Inoltre, sia i Social Incubator che i Mixed Incubator mostrano una marcata attenzione all'educazione imprenditoriale e manageriale. Marconatto et al. (2019) osservano che il processo di incubazione è associato positivamente alla sostenibilità delle Solidarity Economy Organizations[3] (SEOs) in Brasile, e che le realtà incubate presentano una maggiore probabilità di stabilire delle relazioni cooperative, grazie ai network che queste sviluppano stando all'interno dell'incubatore.

[3] Le SEOs sono imprese che operano solitamente nel Terzo Settore e sono create dai membri delle comunità che queste servono, con il fine di contribuire a un mondo più sostenibile (Marconatto et al., 2019).

Obiettivi della ricerca. *La recente letteratura ha esplorato le differenze tra incubatori generalisti e incubatori con una maggiore attenzione all'impatto (Sansone et al., 2020), così come il potenziale delle attività di incubazione nel promuovere la sostenibilità delle imprese (Marconatto et al., 2019). Tuttavia, resta ancora poco esplorato il modo in cui gli incubatori possano supportare le imprese dedite all'impatto a superare le barriere che ostacolano la generazione dello stesso. Pertanto, l'obiettivo di questa ricerca è quello di contribuire al dibattito scientifico sull'impatto sociale, indagando il ruolo che gli incubatori possono avere nel supportare le imprese dedite alla generazione dell'impatto. Nella fattispecie, questo studio cerca di rispondere alla seguente domanda di ricerca: date le barriere alla crescita identificate in letteratura (Davies et al., 2019), gli incubatori e gli acceleratori possono contribuire al superamento delle suddette e alla scalabilità delle imprese dedite all'impatto sociale?*

Metodologia. *Lo studio segue un approccio di ricerca qualitativa, fondato sulla teoria e sull'interpretazione dei dati raccolti da diverse interviste effettuate direttamente agli incubatori italiani, elaborati secondo i principi della Grounded Theory (Glaser e Strauss, 1967). L'utilizzo di questo approccio si rivela vantaggioso in situazioni in cui il fenomeno oggetto di analisi non è completamente compreso prima dell'avvio dello studio. In tali circostanze, e quando l'obiettivo del processo di ricerca include la formulazione di una nuova teoria, l'adozione di un approccio qualitativo risulta essere preferibile (Rubin, Aas e Stead, 2015).*

Nella presente ricerca sono impiegate più fonti di dati, quali articoli scientifici, riviste, informazioni pubblicate in rete, a cui si aggiungono i dati primari ottenuti dalle interviste semi strutturate (Gioia, Corley ed Hamilton, 2013). Questa tipologia di interviste consente di rimanere flessibili e adattarsi al contesto e alle risposte del partecipante, garantendo l'integrità dell'obiettivo della ricerca grazie a un set di domande preimpostate.

Per la costruzione del campione, è stato deciso di circoscrivere l'analisi al solo contesto italiano. La ragione di questa scelta risiede nel fatto che si sono volute limitare le differenze normative, sociali e culturali che potrebbero sussistere se si considerasse un contesto territoriale di ordine superiore. In tal senso, sono selezionati incubatori esclusivamente italiani certificati dal Ministero delle Imprese e del Made in Italy (MIMIT), accedendo direttamente alla banca dati del Registro delle Imprese. Alla popolazione di incubatori così identificata (63 incubatori[4]), è applicato un ulteriore criterio di selezione, che si basa su quanto evidenziato in letteratura. Considerata la domanda di ricerca, si è ritenuto opportuno selezionare solamente gli incubatori che ponessero una particolare attenzione alla creazione di impatto sociale. Pertanto, all'interno della popolazione di 63 incubatori, è stato individuato un campione costituito dai soli social incubators e mixed incubators. La selezione dei suddetti incubatori è il risultato dall'osservazione dei portafogli da loro detenuti e delle dichiarazioni pubblicate sui loro siti ufficiali[5]. In particolare, sono stati selezionati gli incubatori con almeno un'impresa dedita all'impatto in portafoglio, rispettando la definizione di mixed e social incubator[6]. Questa mappatura ha portato a individuare un campione di 18 incubatori interessati alla creazione di impatto sociale, così distribuiti lungo il territorio italiano: 12 localizzati nell'area Nord del territorio italiano; 5 localizzati nell'area Centro; 1 localizzato nell'area Sud e Isole.

I partecipanti sono contattati virtualmente tramite indirizzo mail e/o profilo LinkedIn: a ciascuno di essi è presentato l'argomento e l'obiettivo di ricerca, ed è fornito il set di domande per l'intervista. Il tasso di risposta alla richiesta di partecipazione è finora del 50%, corrispondente a 9 incubatori su 18 totali. Le domande delle interviste sono state realizzate sulla base dei contributi della letteratura e, in particolare, delle tre barriere che ostacolano la crescita delle imprese dedite all'impatto sociale.

L'analisi dei dati ottenuti ha seguito i principi generali della Grounded Theory. In particolare, è stata attuata una procedura di codifica manuale, la quale offre "maggiore controllo e proprietà dell'opera" (Cozzolino, Corbo e Aversa, 2021). Attraverso questa procedura di codifica sono stati generati concetti di primo ordine (fase 1), temi di secondo ordine (fase 2) e dimensioni aggregate (fase 3). Come per ogni studio qualitativo, l'analisi è stata un processo dinamico e iterativo, caratterizzato da continui riferimenti a dati e teoria per convalidare le conclusioni.

***Fase 1: creazione delle categorie di primo ordine**. In questa fase, l'obiettivo è quello di conformarsi rigorosamente ai termini forniti dagli intervistati, il che può portare a ottenere una gamma di categorie di primo ordine molto ampia (Gioia, Corley ed Hamilton, 2013).*

Da un punto di vista procedurale, si è proceduto con l'analisi delle interviste effettuate e del materiale secondario, al fine di individuare i concetti chiave e formulare delle categorie rappresentative. I concetti similari sono stati accorpati per evitare ridondanze.

***Fase 2: creazione dei temi di secondo ordine**. Nella fase 2, il processo si distingue per la ricerca e l'analisi di temi di ordine superiore. Nella fattispecie, si richiede l'individuazione di similitudini e di differenze tra le categorie sopra specificate (Gioia, Corley ed Hamilton, 2013).*

Pertanto, si è proceduto a identificare dei temi di ordine superiore, combinando le categorie di primo ordine in base alle condizioni causali, il fenomeno sottinteso, il contesto e le interazioni.

***Fase 3: creazione delle dimensioni aggregate.** In questa fase dell'operazione di codifica, si richiede di determinare le dimensioni aggregate sottostanti ai temi di secondo ordine.*

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4 Il dato è aggiornato al 02/02/2024.

5 I siti che sono stati visionati sono quelli che sono stati dichiarati nella sezione speciale del Registro delle Imprese.

6 L'analisi qualitativa dei portafogli e dei siti ufficiali è avvenuta ricercando elementi quali obiettivi espliciti di impatto e metriche di valutazione dell'impatto.

Il processo implica un esame approfondito su più livelli simultanei, che consideri sia i codici impiegati dagli intervistati, sia le teorie e i concetti più astratti che emergono dall'analisi (Gioia, Corley ed Hamilton, 2013). In particolare, si procede all'aggregazione dei temi simili, individuando delle dimensioni di ordine superiore che siano coerenti con le diverse tematiche emerse.

Risultati. *L'analisi dei dati qualitativi ha generato le seguenti dimensioni aggregate: 1) gestione strategica dell'impatto; 2) infrastruttura finanziaria per l'impatto sociale; 3) divulgazione proattiva per l'impatto sociale.*

Per quanto concerne la prima dimensione, la "gestione strategica dell'impatto" rappresenta la soluzione alle barriere basate sui valori, le quali fanno riferimento alle differenze nei valori etici e alla filosofia di crescita. Questa dimensione, infatti, spiega come sia possibile superare un disallineamento nei valori etici all'interno della catena del valore. In questa dimensione aggregata rientrano i seguenti temi di secondo ordine: a) valutazione e decisione; b) comunicazione di valore a monte; c) coinvolgimento attivo del network. Nel caso del tema "valutazione e decisione", il supporto proattivo dei mentori e il monitoraggio delle metriche sono gli elementi caratterizzanti. A tal proposito, il supporto dei mentori è emerso nelle interviste come segue: "Quando le startup cominciano a scalare facciamo un matching con mentori di esperienza". Al contempo, all'interno del "coinvolgimento attivo del network" sono presenti i seguenti temi di secondo ordine: a) networking con gli stakeholder; b) matching diretto. Questi due aspetti sono emersi durante le interviste, come si evince dal seguente codice: "Noi cerchiamo di promuovere quella che è una catena di valore, anche nel rapporto tra fornitori, nelle relazioni con gli stakeholders. Cerchiamo di favorire questo networking andando a individuare le aziende, i fornitori o gli stakeholders più pronti".

Per quanto riguarda la dimensione aggregata "infrastruttura finanziaria per l'impatto sociale", questa rappresenta la soluzione alle barriere basate sul modello di business, le quali fanno riferimento alle difficoltà di accesso ai finanziamenti. Attraverso la dimensione "infrastruttura finanziaria per l'impatto sociale" si spiega come sia possibile facilitare l'accesso alle forme di finanziamento nel caso delle imprese dedite all'impatto. All'interno della suddetta dimensione sono stati identificati i seguenti temi di secondo ordine: a) supporto diretto all'impatto sociale; b) ecosistema di sviluppo imprenditoriale simbiotico. All'interno del tema "supporto diretto all'impatto sociale", l'accompagnamento attraverso servizi di consulenza appositi e il supporto finanziario effettuato direttamente dagli incubatori risultano essere delle voci particolarmente rilevanti, come si evince dal seguente codice: "Cominciamo a confrontarci anche con tematiche di finanziamento. Quindi diamo evidenza dei primi bandi, e li accompagniamo anche nella ricerca di bandi finanziamenti.". Nel caso del tema "ecosistema di sviluppo imprenditoriale simbiotico", le partnership attuate con gli attori esterni sono di importante rilevanza. Dalle interviste emerge quanto segue: "L'incubatore è in contatto con una serie di attori sia privati, ma anche istituzionali (penso a Invitalia, o Cassa Depositi e Prestiti). Attraverso i suoi contatti con investitori istituzionali e non istituzionali (pensiamo anche a dei singoli imprenditori che possono investire in startup), l'incubatore può veicolare il messaggio della startup andando a toccare i punti per i quali gli investitori sono più sensibili".

Infine, la dimensione aggregata "divulgazione proattiva per l'impatto sociale" si identifica come soluzione alle barriere istituzionali, le quali riguardano il comportamento dei consumatori rispetto all'impatto sociale e le norme aziendali tradizionali. Nella fattispecie, attraverso la dimensione "divulgazione proattiva per l'impatto sociale" si spiega come sia possibile educare in maniera attiva al concetto di impatto. All'interno di questa dimensione rientrano i seguenti temi di secondo ordine: a) educazione all'impatto a valle; b) facilitazione dell'interazione istituzionale. Per quanto concerne il tema "educazione all'impatto a valle", sono collocate attività come la divulgazione sui propri canali social delle startup a impatto di successo e le iniziative di "give back" verso attori esterni agli incubatori. Ad esempio, l'attenzione alla divulgazione è riscontrabile dal seguente codice: " Quindi ogni volta che noi veniamo a conoscenza di, per esempio, startup sostenibili o casi di successo, li condividiamo sui nostri canali social con nostre iniziative di comunicazione". Allo stesso tempo, nel tema "facilitazione dell'interazione istituzionale" è di primaria rilevanza il dialogo con gli ambienti burocratici, come si evince dal seguente codice: "Noi siamo proprio un intermediario. Uno dei nostri lavori principali è tradurre il "burocratese" in linguaggio comune. Per cui noi interpretiamo i bandi in modo che siano accessibili a tutti quanti, fornendo anche network con la regione. Conosciamo gli enti regionali, conosciamo direttamente le persone che ci lavorano".

Queste tre soluzioni identificate (gestione strategica dell'impatto, infrastruttura finanziaria per l'impatto sociale e divulgazione proattiva per l'impatto) concorrono a identificare un approccio integrato alle sfide che le imprese dedite all'impatto sociale devono affrontare nel loro percorso di crescita. Attraverso questo studio emerge che gli incubatori e gli acceleratori svolgono un ruolo importante nel fornire supporto manageriale, finanziario e di networking, così come definito in letteratura. Il contributo particolare di questa ricerca risiede però nel fatto che ci si è concentrati maggiormente sui social e sui mixed incubators, i quali possono rendere il percorso di crescita delle imprese dedite all'impatto sociale più fiorente, grazie alla maggiore attenzione che questi istituti ripongono sulla tematica e all'offerta di strumenti specifici per l'impatto.

Limiti della ricerca. *Un primo limite di questo studio è legato alla dimensione campionaria ridotta. In particolare, si prevede che siano necessarie altre interviste per poter raggiungere la saturazione teorica. Queste interviste sono in corso, parallelamente alla stesura di questo paper. Pertanto, le soluzioni ottenute potrebbero subire modifiche future, ma rappresentano, ad oggi, un valido punto di partenza. Considerando le peculiarità degli incubatori all'interno del contesto italiano come legate a caratteristiche territoriali e normative, la generalizzazione dei risultati in altri contesti potrebbe essere limitata.*

Implicazioni manageriali. *I risultati dello studio forniscono indicazioni pratiche sia ai manager degli incubatori/acceleratori, sia ai policymaker, su come strutturare modelli di business efficaci e sostenibili. I dati evidenziano come la presenza di un ecosistema collaborativo possa favorire uno sviluppo economico sostenibile, e come gli incubatori orientati all'impatto possano svolgere un ruolo cruciale nel promuovere tale sviluppo, contribuendo al superamento delle barriere di natura valoriale, finanziaria e istituzionale. Lo studio sottolinea, inoltre, che gli incubatori sociali non possono operare in modo isolato, ma il loro successo dipende dalla capacità di creare connessioni efficaci con stakeholder chiave dell'ecosistema.*

Originalità della ricerca. *Questo studio intende arricchire il dibattito scientifico sull'impatto sociale, esplorando il ruolo degli incubatori e degli acceleratori dediti alla sua generazione. L'attenzione attorno a questi attori, specialmente per quanto concerne la loro capacità di promuovere sia dei modelli di business sostenibili (Marconatto et al. 2019), sia l'imprenditoria dedita all'impatto (Bonfanti et al., 2025; Pandey et al., 2017), è crescente. La precedente letteratura ha evidenziato risultati significativi sulla capacità di queste organizzazioni di promuovere la sostenibilità, la coopetizione e la maggiore partecipazione a network di attori chiave (Marconatto et al., 2020; Nascimento et al., 2021), tuttavia rimane ancor poco esplorato il modo in cui gli incubatori possano aiutare a superare le barriere che ostacolano la generazione dell'impatto. Questo lavoro si propone di colmare questa lacuna, approfondendo il ruolo degli incubatori nella promozione di un ecosistema imprenditoriale orientato all'impatto.*

Parole chiave: *impatto sociale; incubatori sociali; start-up; valore condiviso.*

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Stili di leadership e tratti della personalità: strategie per eccellere nelle organizzazioni non-profit

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Abstract

Il manager riveste un ruolo cruciale e di grande responsabilità, influenzando direttamente i risultati aziendali. La sua capacità di prendere decisioni diventa ancora più complessa nel contesto delle organizzazioni non-profit, che devono affrontare sfide finanziarie legate a risorse limitate. In alcuni casi, ciò comporta anche il coinvolgimento volontario degli stessi manager.

L'obiettivo di questa ricerca è comprendere quali combinazioni di tratti della personalità e quali stili di leadership favoriscano un ambiente di lavoro positivo all'interno delle organizzazioni non-profit, contribuendo alla coesione del team e al miglioramento dei risultati finanziari nel tempo.

Lo studio è stato condotto attraverso una ricerca-azione all'interno di un'organizzazione non-profit purpose-driven del terzo settore. I risultati ottenuti hanno avuto un impatto significativo non solo sulla letteratura scientifica, ma anche sulla pratica gestionale. In particolare, sono state elaborate linee guida destinate ai manager delle organizzazioni non-profit, con l'obiettivo di aiutarli a valorizzare le proprie caratteristiche personali e a individuare gli stili di leadership più efficaci per affrontare le sfide del settore.

Framing of the research. *Il successo o il fallimento dell'azienda nel raggiungimento degli obiettivi dipendono soprattutto dal ruolo del manager (Fujianti, 2018; Sitthipongpanich & Polsiri, 2014) e dalle sue capacità. Precedenti ricerche sulle organizzazioni non-profit hanno documentato l'impatto delle decisioni dei manager (Hwang & Powell, 2009) che devono essere in linea con la missione dell'organizzazione (Drucker, 2004). Esistono due forme organizzative principali: organizzazioni non-profit con personale e organizzazioni non-profit basate su volontari (Hwang & Powell, 2009). Le organizzazioni non-profit basate sui volontari si trovano ad affrontare preoccupazioni maggiori relative alla progettazione organizzativa, alle questioni relative alle risorse umane e al mercato del lavoro, tra cui la retribuzione dei lavoratori (Baron, 2004). La sostenibilità finanziaria rappresenta una sfida costante per le organizzazioni non-profit, le quali si trovano spesso a operare in contesti instabili e in un ambiente finanziariamente turbolento (Golensky & Mulder, 2006). Tuttavia, la continuità delle loro attività è fondamentale per poter continuare a generare valore sociale attraverso il perseguimento della propria missione istituzionale (Weerawardena et al., 2010).*

In questo scenario, i tratti della personalità e lo stile di leadership adottato dai manager assumono un'importanza cruciale perché essi modellano la strategia e la cultura organizzativa e devono creare coesione all'interno dell'organizzazione. Poiché il personale delle organizzazioni non-profit è composto in larga parte da volontari, è fondamentale che i leader sappiano valorizzare la visione e i principi ispiratori dell'ente, contribuendo alla coesione interna, al benessere e alla motivazione dei collaboratori. Numerosi studi hanno evidenziato che questi tratti sono stabili nel tempo (McCrae & Costa, 1990), presentano una componente ereditaria significativa (Loehlin, 1992) e hanno importanti implicazioni comportamentali. La personalità di un manager è un fattore cruciale per ottenere successo e per guidare un alto livello di performance lavorativa in ogni organizzazione (Gupta & Gupta, 2020) e può essere vista come un insieme di tratti distintivi che influenzano il suo comportamento, atteggiamento, motivazione e cognizione in situazioni specifiche. Ozer e Benet (2006) sottolineano la personalità di un manager gioca un ruolo cruciale nel modo in cui affronta e risolve problemi complessi. In questo studio sono stati considerati i modelli della personalità quali la Dark Triad e la Light Triad come base teorica per comprendere le dinamiche interpersonali e per comprendere la relazione con i diversi stili di leadership (ad esempio, Kaletta & Reuther, 2021; Paunonen et al., 2006; Sacavém & de Bem Machado, 2023).

Il Dark Triad è un concetto che si riferisce a tre tratti di personalità considerati negativi (ad esempio, Brownell et al. 2021; Hirschfeld & Van Scotter 2018) che sono:

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1) *Narcisismo (Narcissism): Si tratta di una tendenza a essere egocentrici, a cercare costantemente ammirazione e a ritenersi superiori agli altri. Le persone con tratti narcisistici hanno una visione distorta del proprio valore e spesso sono indifferenti alle esigenze altrui (Sacavém & de Bem Machado, 2023).*
2) *Machiavellismo (Machiavellianism): Il machiavellismo si manifesta in una visione cinica del mondo, freddezza emotiva, pragmatismo, manipolazione interpersonale e la ricerca di obiettivi egoistici e utilitaristici (Guillén et al., 2022). I machiavellisti esercitano un controllo coercitivo sugli altri per raggiungere i propri scopi (Hawley, 2003) e sono più propensi a comportamenti non etici (ad esempio, Greenbaum et al., 2017).*
3) *Psicopatia (Psychopathy): Questo tratto è caratterizzato dalla mancanza di empatia, impulsi aggressivi e comportamenti antisociali. Chi mostra tratti psicopatici può essere insensibile ai sentimenti degli altri, impulsivo e disposto a infrangere le regole per ottenere ciò che vuole (Paulhus & Williams, 2002) attraverso la manipolazione. Si mostrano molto sicuri di sé, credono di essere al centro dell'attenzione e disprezzano le opinioni altrui (Sacavém, & de Bem Machado, 2023).*

Infine, la Light Triad (Kaufman, et al., 2019) che ha recentemente ricevuto una considerevole attenzione (ad esempio, Song et al., 2020) è un concetto che descrive tre tratti di personalità positivi e altruisti, come antitesi alla Dark Triad. I tratti della Light Triad sono:

1) *Kantianesimo (Kantianism): Questo tratto di personalità si caratterizza per l'inclinazione a vedere le persone come fini a sé stesse e non come semplici mezzi per raggiungere obiettivi personali (Kaufman et al., 2019). Le persone che incarnano il Kantianesimo sentono il bisogno di rimanere autentiche e si sentono a disagio nel manipolare gli altri (Kaletta & Reuther, 2021).*
2) *Umanesimo (Humanism): Questo tratto implica empatia, rispetto e riconoscimento del valore intrinseco di ogni individuo (Kaufman et al., 2019). Le persone con questa inclinazione tendono a essere felici per i successi altrui e credono che tutti debbano essere trattati con dignità (Cooke, 2020).*
3) *Fede nell'umanità (Faith in Humanity): Chi possiede questa caratteristica crede nella bontà intrinseca delle persone (Kaufman et al., 2019) e ritiene che altri siano onesti e li trattino con giustizia, mostrando una visione ottimistica dell'umanità (Sacavém, & de Bem Machado, 2023).*

In sintesi, i tratti della Light Triad si concentrano sull'empatia, l'altruismo e la positività, promuovendo comportamenti che migliorano le relazioni e la qualità della vita. Invece, i tratti della Dark Triad, pur essendo associati a manipolazione, egocentrismo e scarsa empatia, possono risultare vantaggiosi in alcuni contesti, come nelle posizioni di potere (Brownell et al. 2021; Volmer et al. 2016) poiché è stato dimostrato che tali personalità possiedono competenze essenziali di leadership (Ames et al., 2006; Paunonen et al., 2006). La comprensione dei tratti di personalità dei leader è importante per capire come si rapportano con gli altri e se il loro comportamento può influenzare il comportamento altrui.

Diversi studi in letteratura hanno documentato che le caratteristiche personali del manager influenzano lo stile decisionale del manager (Campbell et al., 2011; Ben Fatma et al., 2013), che, secondo Hersey et al., (2001), può essere suddiviso in 4 categorie:

1- *Delegating, in cui i dirigenti affidano la responsabilità della decisione e dell'attuazione ai loro collaboratori senza un'attenta supervisione;*
2- *Participating, in cui i dirigenti condividono le idee e facilitano la partecipazione al processo decisionale;*
3- *Selling, in cui i dirigenti danno istruzioni specifiche e danno indicazioni chiare su come sono state prese le loro decisioni;*
4- *Telling, in cui i dirigenti danno istruzioni specifiche e monitorano attentamente le prestazioni.*

Lo stile di leadership rappresenta un insieme di comportamenti e caratteristiche attraverso cui il leader influenza e motiva i collaboratori al fine di raggiungere gli obiettivi organizzativi (Hackim et al., 2021). Questi stili non sono rigidi, ma devono essere adattati alle specifiche esigenze del gruppo e al contesto in continua evoluzione. Un leader efficace è in grado di modulare il proprio approccio, passando con agilità tra diversi stili (Almansour, 2012).

Purpose of the paper. *Nelle organizzazioni non-profit il ruolo del manager è ancora più impegnativo perché devono affrontare sfide maggiori legate alla sostenibilità economica in un ambiente instabile (Golensky & Mulder, 2006), oltre a gestire e motivare un personale che è spesso composto da volontari.*

Numerosi studi hanno esplorato il legame tra tratti della personalità e stili di leadership, cercando di individuare quali caratteristiche siano associate a una leadership efficace (Furnham, 2008). Sebbene in letteratura siano presenti alcuni contributi sul tema della leadership nelle organizzazioni non-profit (es. Agard, 2011), esiste ancora un gap significativo per quanto riguarda l'analisi dei tratti di personalità dei manager in relazione agli stili di leadership e ai risultati economici nel tempo, in particolare nel contesto del terzo settore (Cesinger, 2022).

L'obiettivo del presente studio è colmare questa lacuna, analizzando quali combinazioni di tratti della personalità e stili di leadership si siano dimostrate più efficaci anche in termini economici all'interno di una organizzazione non-profit. L'intento è comprendere quali caratteristiche personali e approcci gestionali abbiano contribuito a generare

performance economiche positive, pur operando in un contesto caratterizzato da risorse limitate e personale volontario. Pertanto, la nostra domanda di ricerca è:

RQ: Quali tratti della personalità e stili di leadership hanno contribuito a ottenere i migliori risultati economici nel tempo all'interno di una organizzazione non-profit?

Methodology. *Il metodo utilizzato è quello della ricerca azione che unisce teoria e pratica attraverso il cambiamento e la riflessione in una situazione problematica immediata (Avison et al., 1999). Questo metodo non si limita a promuovere il cambiamento, ma si propone anche di generare conoscenza in relazione a tale trasformazione (Lewin, 1947). Questo approccio implica un coinvolgimento attivo con l'azienda e si articola in un processo iterativo che comprende l'analisi del problema, l'intervento attivo e l'apprendimento riflessivo contribuendo anche allo sviluppo della conoscenza scientifica (Coughlan & Coghlan, 2002). La ricerca è stata svolta in un'organizzazione italiana non-profit del terzo settore che ha manifestato la necessità di avviare una riflessione sulle caratteristiche personali e sugli stili di leadership più efficaci adottati dai loro dirigenti (che svolge il ruolo di presidente del comitato), che svolgono volontariamente tale ruolo. Questa esigenza è nata a seguito di criticità emerse non solo in relazione ai risultati economici, ma anche a tensioni interne ai comitati e alle difficoltà nel rinnovamento delle cariche che si articolano in mandati dalla durata di 4 anni. La natura non-profit dell'organizzazione dovrebbe differire dalle realtà profit solo per finalità e principi e non per efficienza e livello di responsabilità e competenza delle funzioni apicali presenti.*

L'ente non-profit è un'organizzazione purpose-driven, che opera con un forte impegno sociale nel settore sportivo, con l'obiettivo di creare un impatto positivo e duraturo a livello comunitario. Il suo scopo va oltre la mera pratica sportiva, mirando a promuovere il benessere e la salute dei cittadini, la tutela dei beni comuni, la sostenibilità ambientale e la diffusione di principi fondamentali come la dignità umana, la non violenza, la solidarietà, la pace e l'interculturalità.

L'organizzazione è presente su tutto il territorio nazionale ed è strutturata in comitati territoriali, i quali fanno riferimento ai rispettivi comitati regionali. In particolare, un comitato regionale ha richiesto il nostro supporto per affrontare criticità emerse in sei comitati territoriali.

Lo studio è stato articolato in tre fasi, descritte di seguito.

- *Fase 1: Analisi delle dinamiche organizzative*

Nella prima fase, sono state condotte interviste semi-strutturate con i membri del comitato regionale e dei comitati territoriali. L'obiettivo era ricostruire le dinamiche organizzative e individuare i tratti distintivi della personalità dei presidenti in carica nell'ultimo mandato. Per ottenere un quadro chiaro e completo, le interviste non includevano domande dirette sui tratti della personalità, ma affrontavano temi legati alla storia del comitato, alla sua gestione attuale e all'andamento del bilancio nel tempo. Nella Tab.1 vengono descritte le informazioni riguardanti gli intervistati che rappresentavano i vari comitati.

Tab. 1: Informazioni riguardante le interviste

Intervista	***Ruolo degli intervistati***	***Territorio di afferenza***
1	*Presidente, segretario e consigliere*	*Comitato territoriale A*
2	*Presidente*	*Comitato territoriale B*
3	*Presidente, vicepresidente e segretario*	*Comitato regionale*
4	*Presidente, vicepresidente, consigliere e 3 membri del comitato*	*Comitato territoriale C*
5	*Segretario e consigliere*	*Comitato territoriale D*
6	*Presidente e segretario*	*Comitato territoriale E*
7	*Presidente e segretario*	*Comitato territoriale F*

Fonte: elaborazione degli autori

Sono state realizzate le interviste per un totale di 415 minuti. Le interviste sono state condotte in presenza da due ricercatrici e sono state registrate e trascritte per essere analizzate.

- *Fase 2 - Rilevazione percezioni degli stili di leadership*

Nella seconda fase, è stato somministrato un questionario a tutti i membri dei comitati, chiedendo loro di descrivere quale stile di leadership, a loro avviso, fosse stato adottato dal presidente durante l'ultimo mandato. La compilazione del questionario è avvenuta in forma anonima e ha richiesto solo pochi minuti. Sono state ricevute 35 risposte in totale.

- *Fase 3 - Analisi e definizione delle linee guida*

Infine, l'ultima fase ha riguardato l'analisi dei risultati e la definizione di linee guida volte a supportare i comitati nel rafforzare il ruolo del manager, valorizzandone le caratteristiche personali e affinando lo stile di leadership. L'obiettivo non era solo il miglioramento delle performance economiche, ma anche la creazione di un ambiente di lavoro coeso, collaborativo e pienamente in linea con i valori fondamentali dell'organizzazione non-profit.

Results. *Attraverso le tre fasi di analisi sono stati individuati gli andamenti dei bilanci, gli stili di leadership adottati e le caratteristiche personali del presidente nell'ultimo mandato.*

Di seguito, proponiamo una tabella a doppia entrata che illustra gli stili di leadership di ciascun comitato, disposti nelle righe (Delegating, Participating, Telling e Selling), e i tratti della personalità nelle colonne (Dark e Light Triad). I comitati, inseriti in corrispondenza dello stile di leadership adottato nell'ultimo mandato, sono colorati in verde se le loro performance finanziarie sono state eccellenti negli ultimi anni, in arancione se sono state discrete e in rosso se sono state in perdita. All'interno della matrice sono riportate le citazioni degli intervistati relative al presidente in carica, con evidenze dei tratti della personalità riscontrati.

Nel caso del comitato A, caratterizzato dallo stile di leadership Delegating, vengono descritti non solo i tratti della personalità dell'attuale presidente, ma anche quelli delle persone che, pur non ricoprendo formalmente il ruolo di presidente, prendono in pratica le decisioni, poiché, nei fatti, il potere è esercitato da altri.

Tab. 3: Stili di leadership e tratti della personalità

Stili di leadership		Delegating	Participating			Telling	Selling	
Tratti della	Comitati e andamento dei bilanci	Comitato territoriale A	Comitato territoriale B	Comitato regionale	Comitato territoriale C	Comitato territoriale F	Comitato territoriale D	Comitato territoriale E
Dark Triad	Narcisismo	Tratto della personalità riferito ai membri del comitato che effettivamente prendono decisioni al posto del presidente: *"Nel corso del tempo il Comitato è stato modellato su misura, di quelle persone che ci sono da tempo. Ci sono delle cose che sono sempre state fatte così e non si possono cambiare. Se viene tolto il tassellino crolla la piramide".*	*"Ho riorganizzato tutto il Comitato di tasca mia […] Se devi criticare o modificare qualcosa, devi farlo dall'interno, mai dall'esterno".*					*"Io dico che bisogna tenersi anche le persone mature perché io lavoro […] Abbiamo provato a fare partnership con le scuole ma c'è povertà di cultura, non so se sia un mio pregiudizio".*
	Machiavellismo	Tratto della personalità riferito ai membri del comitato che effettivamente prendono decisioni al posto del presidente: *"Le mie idee sono andate un po' in fumo perché non ho avuto la libertà di esercitare il potere di presidente in maniera consona perché c'erano altre persone con personalità più forti e con una presenza storica all'interno del comitato".*						
	Psicopatia	Tratto della personalità riferito ai membri del comitato che effettivamente prendono decisioni al posto del presidente: *"Il Comitato funziona solo così ed è destinato a finire perché non si possono fare cambiamenti e per andare avanti, vengono sfruttate tutte le risorse che arrivano".*						
Light Triad	Kantianesimo	*"Sento di non avere esercitato il potere di presidente perché di fatto mi sono appoggiato tantissimo sugli altri membri della Giunta e del Consiglio".*	*"Il mio compito è stato quello di formare e far conoscere tutti gli ambiti istituzionali dell'organizzazione".*	*"Abbiamo promosso tante attività per far partecipare le persone".*	*"Il presidente è stato poco presente e ci ha lasciato massima libertà perché c'è fiducia sul modo di lavorare".*	*"Abbiamo un Consiglio che funge anche da Giunta e c'è partecipazione di tutti i componenti […] Abbiamo ricostruito l'intero Comitato".*	*"Il presidente si ricandiderà con l'appoggio della segreteria che fa tutto […] non è molto presente perché questo non è il suo principale lavoro".*	*"Noi le Giunte le facciamo seriamente, spieghiamo tutto e parliamo delle decisioni".*
	Umanesimo	*"Le persone che sono nel Comitato mi stanno a cuore […] C'era una sensibilità e una coincidenza di valori ed etica".*	*"Se dobbiamo prendere qualsiasi decisione ci sentiamo con tutti i membri della Giunta. Non è il mio parere quello che detta legge".*	*"Serve una cultura sociale e partecipativa […] Io credo nei valori dell'organizzazione".*	*"Il nostro punto di forza è la coesione del gruppo che interviene e supporta nel momento in cui c'è bisogno".*	*"Io sono molto presente anche con i membri del Comitato, li seguo, li sprono, perché non sempre le cose a livello associativo sono automatiche".*		*"Sono una mediatrice. Alcuni dirigenti non sono al servizio dell'associazione e bisogna ribaltare questa logica".*
	Fiducia nell'umano	*"Siamo veramente appassionati. Non soltanto al lato pratico ma anche a quello umano".*		*"Servono le capacità di lavorare in gruppo e di collaborare con tutte le persone […] La difficoltà delle associazioni è quella di motivare le persone per dare un senso di utilità al volontariato".*	*"Tutto nasce da un legame che si crea tra le persone […] è importante che le persone sviluppino la propria predisposizione e il proprio spazio […] lavorare con passione e credere in quello che si fa per costruire il gruppo".*	*"C'era anche un rapporto umano non indifferente".*		*"Li abbiamo aiutati molto. Abbiamo anticipato dei soldi […] Nel nostro comitato riusciamo ad assicurare tutti i volontari, cosa che non succede sempre".*

Source: Elaborazione degli autori

L'analisi ha evidenziato che gli stili di leadership fondati sulla partecipazione attiva e sul coinvolgimento del team si sono dimostrati, nel tempo, i più efficaci in termini di performance. Tali approcci hanno stimolato una maggiore proattività tra i membri dei comitati, contribuendo a un clima collaborativo e orientato agli obiettivi comuni.

È emerso, inoltre, che i tratti della personalità rivestono un ruolo cruciale nell'andamento complessivo del comitato. Le decisioni dei dirigenti influenzano non solo i risultati economici, ma anche la motivazione, il senso di appartenenza e il coinvolgimento dell'intero gruppo di lavoro. In particolare, i tratti della Dark Triad sono stati associati a performance peggiori: atteggiamenti egocentrici, manipolativi e privi di empatia hanno avuto un impatto negativo sulle dinamiche relazionali all'interno dei team. Questo effetto risulta ancora più marcato nel contesto dell'organizzazione analizzata: un ente non-profit la cui missione si fonda su valori quali partecipazione, condivisione e inclusività. In tale cornice valoriale, comportamenti narcisistici e manipolativi si rivelano chiaramente disallineati e controproducenti.

Inoltre, è stato osservato che la combinazione tra i tratti della Dark Triad e uno stile di leadership di tipo "delegating" - che lascia ampi margini di autonomia ai collaboratori senza un'adeguata supervisione - ha favorito la prevalenza di personalità egocentriche e manipolative, con conseguenti ricadute negative sulla coesione del team e sulle performance finanziarie nel medio-lungo periodo.

È tuttavia importante sottolineare che risultati economici negativi o mediocri non possono essere ricondotti esclusivamente alle caratteristiche individuali del dirigente: anche scelte strategiche non adeguate o fattori esterni, come cambiamenti normativi o crisi settoriali, possono influire significativamente sull'andamento complessivo dell'organizzazione.

Secondo la letteratura, ogni individuo presenta sia tratti luminosi che oscuri della personalità (Kaufman et al., 2019). Ciò che distingue un leader efficace è la capacità di adattarsi rapidamente ai cambiamenti, affrontandoli con consapevolezza. Per sviluppare questa competenza, è essenziale un percorso di formazione continua volto a rafforzare le abilità necessarie alla guida in contesti complessi (Kaletta & Reuther, 2021). Un manager efficace sa accompagnare l'evoluzione di team e organizzazioni, promuovendo valori condivisi e un clima collaborativo. In questo contesto, la leadership "agile" - flessibile, adattabile e orientata alla cooperazione - si lega ai tratti della Light Triad, tra cui empatia, trasparenza e relazioni positive, ritenuti fondamentali per il successo organizzativo (Kaletta & Reuther, 2021) in particolare nelle realtà non-profit, fondate su principi di condivisione, uguaglianza. Migliorare i tratti della personalità e gli stili di leadership dei manager richiede un approccio integrato, sviluppato e condiviso insieme ai comitati dell'organizzazione non-profit. L'obiettivo è rafforzare la connessione tra personalità e leadership, promuovendo non solo una maggiore coesione del team, ma anche un miglioramento sostenibile dei risultati finanziari nel tempo.

I punti chiave delle linee guida condivise includono:

1) *Sviluppo dell'autoconsapevolezza, affinché i manager possano adattare il proprio comportamento in base alle situazioni.*
2) *Coaching e mentoring, per favorire la crescita delle competenze e lo sviluppo di uno stile di leadership più flessibile possibile.*
3) *Formazione specifica su comunicazione efficace, gestione dei conflitti e adattabilità dello stile di leadership, aspetti essenziali per operare con successo in contesti dinamici e complessi come quelli delle organizzazioni non-profit.*
4) *Ricezione di feedback continui da parte dei collaboratori, per migliorare l'efficacia della leadership e promuovere l'apprendimento esperienziale dei dirigenti.*

I punti chiave dopo essere stati discussi con i comitati sono stati poi integrati negli obiettivi del nuovo mandato. La loro attuazione è avvenuta sotto la supervisione delle due ricercatrici, incaricate di monitorare nel tempo le azioni intraprese e di valutare l'efficacia dei progressi e dei miglioramenti raggiunti. Questa strategia potrà essere implementata da tutte le organizzazioni non-profit per rafforzare la propria leadership e ottenere risultati più solidi e sostenibili nel tempo.

Research limitations. *Sebbene questa ricerca offra spunti significativi e contribuisca ad ampliare la conoscenza sul ruolo del manager all'interno delle organizzazioni non-profit, è fondamentale riconoscerne alcune limitazioni, al fine di delineare possibili direzioni per futuri sviluppi.*

Una prima limitazione riguarda l'ambito dello studio, circoscritto all'analisi di un singolo caso. Sebbene il caso selezionato abbia consentito un'analisi approfondita e dettagliata, la generalizzabilità dei risultati risulta limitata. L'estensione della ricerca a un campione più ampio permetterebbe di ottenere una visione più completa e comparativa del fenomeno.

Inoltre, la realizzazione di uno studio longitudinale consentirebbe di valutare con maggiore accuratezza l'impatto delle soluzioni proposte, non solo in termini di performance immediate, ma anche rispetto alla loro sostenibilità nel lungo periodo. Questo tipo di approccio permetterebbe di monitorare l'evoluzione dei comportamenti manageriali, la stabilità degli stili di leadership adottati e la loro influenza sul clima organizzativo e sui risultati economici nel tempo.

Managerial implications. *Questa ricerca ha offerto importanti contributi sia teorici che manageriali.*

Dal punto di vista teorico, lo studio ha arricchito la letteratura esistente esplorando i tratti di personalità in relazione agli stili di leadership e ai risultati economici di un'organizzazione non-profit. Negli ultimi quindici anni, la ricerca si è concentrata principalmente sui tratti oscuri della personalità (Kaufman et al., 2019; Moshagen et al., 2018), trascurando quelli positivi, creando una lacuna nella comprensione integrata dei tratti della personalità (Kaufman et al., 2019). La

nostra analisi ha contribuito a colmare questo gap, confermando, in linea con studi precedenti (Mathieu et al., 2014) che i tratti della Dark Triad influenzano negativamente le dinamiche relazionali e le performance complessive. Inoltre, lo studio ha esaminato come i tratti luminosi e oscuri influenzino i team e le performance organizzative, proponendo una tabella a doppia entrata utile anche per future ricerche sulle relazioni tra leadership, tratti di personalità e performance economico-finanziarie.

Dal punto di vista manageriale, le soluzioni proposte offrono uno strumento pratico per formare manager consapevoli e preparati, in grado di affrontare con efficacia situazioni complesse e di migliorare le performance nel lungo periodo. Sebbene sviluppati in un caso specifico, queste osservazioni sono applicabili anche ad altri enti non-profit, che si trovano a fronteggiare sfide sempre più complesse, come la sostenibilità economica delle loro attività.

Originality of the paper. *L'originalità dell'articolo emerge da diversi elementi innovativi. In particolare, l'integrazione dei tratti della personalità nei modelli di leadership e performance finanziaria costituisce un contributo teorico rilevante. L'articolo esplora infatti le possibili interazioni tra vari tratti della personalità, gli stili di leadership e i risultati economici a lungo termine all'interno di un'organizzazione non-profit. Questo approccio si distingue dalla letteratura esistente, che tende a focalizzarsi su singoli tratti o dimensioni, trascurando la complessità delle loro interazioni. Inoltre, l'articolo colma un importante gap nella ricerca empirica esistente, in particolare riguardo alla mancanza di studi che esplorano sia i lati chiari che oscuri dei comportamenti dei manager nelle organizzazioni non-profit. L'approfondimento sugli effetti dannosi delle Dark Triad sui team arricchisce la letteratura con nuove evidenze empiriche.*

Key words: *organizzazioni non-profit; stili di leadership; tratti della personalità; performance; ricerca-azione*

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Redefining business for a sustainable future: firm transformation through a purpose-driven logic

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Abstract

Purpose-driven businesses are increasingly recognized as emerging models capable of addressing contemporary social and environmental challenges while maintaining economic performance.

This study explores the transformation of traditional firms into purpose-driven organizations, focusing on the Italian company Bionike. Using a qualitative case study approach, the research investigates how corporate purpose can be integrated into a firm's strategic orientation and business model. The findings reveal a multidimensional transformation process, grounded in internal identity and shaped by interactions with the broader stakeholder ecosystem. This study contributes to the literature on purpose-driven transformation by identifying key alignments, such as the integration of strategy and business model, and the essential role of ecosystem-driven purpose alignment. In doing so, it offers both theoretical insights and practical guidance for organizations seeking to foster sustainable and responsible business transformation.

Framing of the research. *The evolving role of business in society has gained increasing attention within both academic and managerial domains. Firms are no longer perceived as economic entities focused on profit maximization, but as influential actors capable of addressing complex social and environmental challenges. This shift calls for the integration of sustainability into the core of organizational strategies, processes and value creation mechanisms (Carballo, 2023; Lyon et al., 2024; Jimenez et al., 2021; Shakeel et al., 2020; Geissdoerfer et al., 2020; Geissdoerfer et al., 2023).*

One of the most recent developments within this evolving landscape is the emergence of purpose-driven businesses (PDBs). Despite their growing relevance in practice, the academic understanding of PDBs remains conceptually underdeveloped, with limited theoretical consolidation (Lyon et al., 2021; Henderson, 2021; George et al., 2023). PDBs are firms that pursue multidimensional value creation by embedding social and environmental goals alongside financial objectives. They don't merely comply with external demands but proactively seek to generate positive societal impact, positioning moral and ethical considerations at the core of their strategic orientation (Lyon et al., 2024; Gionfriddo et al., 2024; Rey et al., 2019). PDBs are socially oriented organizations that inspire others by promoting sustainability and adopting management practices centered on human dignity, which are integral to their operations (Gionfriddo et al., 2021).

Such firms often act as institutional entrepreneurs by promoting systemic change across industries and advocating for policy frameworks that enhance social and environmental well-being (Henderson, 2021; Lyon et al., 2024). Becoming a PDB requires more than formulating a purpose statement; it entails the diffusion of purpose throughout the organizational structure, aligning decision-making processes, resource allocation, and employee engagement around a common mission (Gartenberg, 2022; George et al., 2023). PDBs typically adopt a shared value logic, aiming to simultaneously deliver economic, social, and environmental returns. Some are founded with an explicit purpose orientation ("profit for purpose"), while others progressively integrate it into their existing business model ("profit with purpose") (Gionfriddo et al., 2024). Transitioning toward a purpose-driven model often involves a profound transformation. This includes redefining corporate identity, reconfiguring governance and operational structures, and adopting new business models that integrate responsibility and sustainability as core design principles (Lyon et al., 2024; Carballo, 2023; Henderson, 2021; Rey et al., 2019). As Sebhatu and Enquist (2022) argue, such transformations are not merely reactive but represent strategic choices aimed at long-term societal relevance and organizational resilience.

Transformation demands collaborative engagement with a broad set of stakeholders, including governments, civil society and industry peers, and requires investments in capabilities that enable systemic innovation (Loorbach & Wijsman, 2013; Müller & Pfleger, 2014). Within this context, the concept of Creating Shared Value (CSV) offers a critical lens through which companies can reconceptualize their role, aligning business success with the generation of mutual benefit for both the firm and society (Porter & Kramer, 2019).

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Theoretical Framework. *This study introduces a theoretical framework that considers purpose as a strategic catalyst, as the organization's core reason for existence and as a guiding principle for long-term value creation. It is a theoretical synthesis grounded in the literature on purpose-driven businesses and business transformation towards them.*

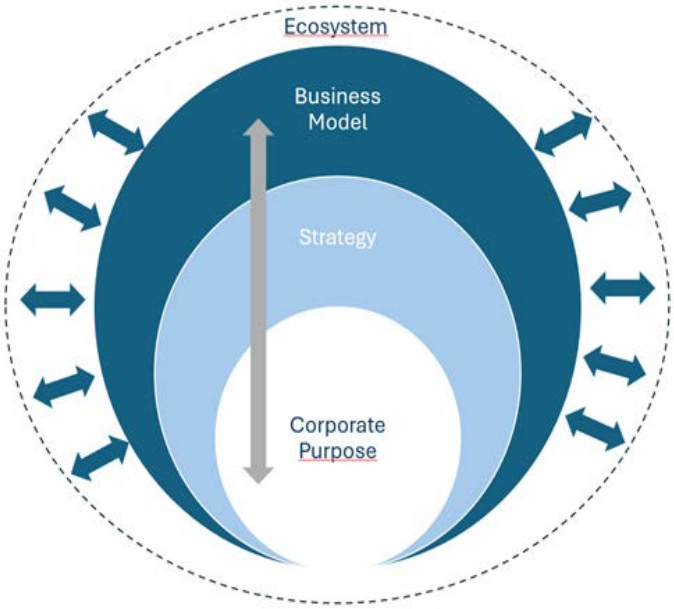
Literature points out as authentic purpose emerges from the organization's cultural, historical and identity-based foundations, while also reflecting its role within society (Jimenez et al., 2021; Lyon et al., 2024; Von Ahsen & Gauch, 2022; Rey et al., 2019; Waddock, 2020). Rather than representing a static objective, purpose is conceptualized as a dynamic construct, which continuously requires aligning of firm's values, vision, strategy and performance indicators (Jimenez et al., 2021; Rey et al., 2019). Effective implementation requires conceptual clarity, strategic integration and organizational alignment across all levels (Gartenberg, 2022; Rey et al., 2019). Embedding purpose within the business model is crucial to ensuring coherence between aspirational narratives and operational realities, thereby mitigating the risk of "purpose-washing" (Sebhatu & Enquist, 2022; Rey et al., 2019).

Moreover, purpose orientation influences core components of the business model, including the value proposition, mechanisms of value creation and systems of value delivery. A purpose-aligned value proposition typically encompasses offerings that contribute to customers' economic and social well-being, while fostering consumer engagement in co-creating sustainable and responsible outcomes (Kropfeld & Reichel, 2024; Osterwalder & Pigneur, 2011; Ernst et al., 2023).

Strategic alignment of business models with purpose reshapes internal operations, reconfigures value chains, and transforms organizational structures to reflect broader commitments to social and environmental responsibility (Shakeel et al., 2020). This shift entails a redefinition of corporate value creation logics, expanding beyond economic performance to incorporate societal and ecological outcomes. Key levers of this transition include the design of the value proposition, allocation of business resources, operational processes and profit formulas. Purpose-driven business model transformation enables stronger customer relationships, fosters sustainable consumption patterns, and enhances long-term organizational resilience and legitimacy of firm (Osterwalder & Pigneur, 2011; Kropfeld & Reichel, 2024; Ernst et al., 2023).

The framework further emphasizes the role of the stakeholder ecosystem in shaping purpose implementation. Purpose is not solely an internal construct; rather, it is co-created through interaction with a broad network of internal and external stakeholders. This process-based view highlights the importance of dialogic engagement, reciprocity and mutual influence in defining corporate identity and stakeholder expectations (Rey et al., 2019; Sebhatu & Enquist, 2022).

Accordingly, corporate purpose should emerge through iterative co-creation rather than hierarchical imposition. This approach enhances stakeholder trust, facilitates the alignment between strategic intent and stakeholder interests and reduces the likelihood of symbolic adoption. The stakeholder ecosystem may function as either an enabler or a constraint in the organizational shift toward a purpose-driven paradigm, underscoring the interdependent nature of transformation processes in contemporary business systems.



Source: Our elaboration

Purpose of the paper. *Despite the growing interest in the transformation of firms into PDBs, existing research has primarily focused on firms that were purpose-oriented from inception, typically exhibiting dual purpose of financial viability and societal impact (Carballo, 2023). As a result, less attention has been given to traditional firms undergoing transformation toward purpose-driven models or to those that operate with a strong sense of purpose without formally identifying as such. Moreover, while entities such as B-Corps, social enterprises and other hybrid organizations are*

frequently labeled as purpose-driven, the conceptual boundaries of their identity remain insufficiently defined and analytically underexplored (Lyon et al., 2024).

This study seeks to fill this gap by identifying the key drivers that enable and shape the transformation of firms into purpose-driven companies. Accordingly, it aims to analyze the integration of purpose into a firm's strategy and business model and how the broader ecosystem, particularly the stakeholder environment, can act as a catalyst in supporting and fostering the adoption of a purpose-driven approach.

Methodology. *Given the lack of specific literature on the transformation of firms according to a purpose-driven approach, an inductive research design has been chosen, focusing on the qualitative analysis of a single case study (Yin, 2009). The case study approach is particularly suitable for this research for the novelty of the topic (Yin, 2009) and the exploratory nature of the research, which aims to understand a contemporary phenomena in its real context (Eisenhardt, 1989). It allows the collection of rich, in-depth data from multiple sources (Blasco-Arcas et al., 2020) and follows a holistic research design (Halinen & Törnroos, 2005).*

The selected case is Bionike, chosen for three main reasons. First, Bionike is a long-established company that was founded in 1960 and has always focused on individual well-being. In recent years, this focus has evolved and intensified, so that the company is clearly on its way to becoming a purpose-driven business. Second, the case offers a high potential for detection, as the transformation process under investigation is "transparently observable" (Eisenhardt, 1989). Third, Bionike actively supported the research process by participating in in-depth problem-centred interview. BioNike is a leading brand in the dermocosmetic market belonging to the Sodalis Group, an independent European company engaged in the personal care, health, and beauty industries. The Group is guided by a strategic commitment to sustainability and people-centered value creation.

Data collection was developed in two research phases and is currently still ongoing. The first phase, carried out between October 2024 and February 2025, focused on the collection of secondary data to investigate and contextualize Bionike's ongoing transformation into a purpose-driven company. Specific attention was paid to how the firm has been reinforcing its long-standing commitment to sustainability. The data sources included online documents, sustainability reports, news articles, and publicly available content from the company's website.

The second phase, which began in February 2025 and is currently in progress, involves the collection of primary data through a series of planned semi-structured interviews with Bionike's ESG Manager, Dr. Federica Brunetti. The interview, which lasted approximately one hour, was audio-recorded, transcribed verbatim and subsequently analyzed and coded according to the theoretical framework outlined above.

Given that the research is still underway, this paper presents preliminary reflections and early insights based on the current stage of the study. Results and a more comprehensive analysis will be developed and integrated as the research progresses.

Results. *The study's findings are structured according to our theoretical framework.*

Purpose-Driven Strategic Alignment - *Corporate purpose is deeply embedded in the firm's strategy core elements (mission, vision, values and goals) and fully integrated into its business model. Purpose represents the fundamental reason for a company's existence, expanding beyond economic value creation to incorporate social and environmental impact. For Bionike, corporate purpose represents the key driver for its transformation towards a purpose-driven business model. Its mission is to deliver high-performance products and high-quality dermocosmetics while maintaining a strong commitment to innovation and sustainability. Rather than undergoing a fundamental redefinition, this purpose has evolved to explicitly incorporate social and environmental value creation, as sustainability has always been an integral part of Bionike's identity. Since 2023, the company has formally structured and implemented this long-standing commitment.*

"Bionike's commitment to sustainability has been deeply rooted in its corporate values for years, but it has become more concrete in recent times. The year 2023 marked a pivotal moment when this commitment was translated into action through targeted initiatives and the development of a three-year ESG action plan. This process began with a comprehensive assessment of ESG-related issues, conducted across all companies within the Sodalis Group.

Supporting communities, promoting art, and prioritizing people's well-being have always been core values for Bionike. Over time, these priorities, particularly environmental concerns, have gained even greater significance as awareness of the urgent need for action, such as combating climate change, has grown. Addressing these challenges is essential to driving meaningful change.

Even before formalizing its ESG strategy, Bionike was already taking steps in this direction-tackling the issue of microplastics and advancing eco-packaging solutions, with a focus on recycled rather than merely recyclable materials. While sustainability had long been an integral part of Bionike's approach, 2023 marked a decisive shift: the company formally committed to a structured and proactive sustainability strategy, taking concrete action to make a lasting impact."

Federica Brunetti, ESG Manager Bionike.

BioNike has been dermatological experience and scientific innovation, committed to guaranteeing high-performance, high dermo-affinity products for the wellbeing of even the most sensitive skin. The company's values include science and

innovation, bellessere (a concept that merges well-being and beauty), quality and safety, inclusion and social responsibility, ethics and transparency, and a strong commitment to sustainability. Its vision is to establish the science of bellessere, integrating dermatological innovation and scientific research to promote both well-being and beauty. Bionike embodies a broader commitment to life itself-dedicated not only to skin health but also to the well-being of people and the environment in which we live.

"The Bionike's purpose has not changed. The mission is always the same. This commitment to the environment, people and social issues has certainly been reinforced. Bionike was born with the mission of caring for the most sensitive skin. This commitment to environmental, social and governance sustainability has been implemented and formalized over the last few years. The name Bionike originates from the Greek words Bio (life) and Nike (victory), symbolizing the "victory of life." Embracing this etymology, we have committed to taking concrete action for both skin health and the world we live in. We understand that our business cannot exist independently of environmental responsibility, respect for future generations and the well-being of our employees. Our conception of sustainability is crucial, as it extends beyond environmental considerations to encompass a comprehensive, 360-degree approach. This entails integrating corporate strategies with sustainability principles, ensuring that sustainability issues take a decisive and central role, driving all business decisions and strategic directions."

Federica Brunetti, ESG Manager.

Bionike has always maintained a strong social focus within its corporate purpose. The company is committed to enhancing employee welfare and well-being by investing in work-life balance, diversity and inclusion, as well as professional development and training. Moreover, Bionike actively supports the broader community by funding research projects, assisting vulnerable people, and providing financial aid to social initiatives.

"For Bionike, well-being also means the well-being of individuals within the socio-cultural context they belong to. This is why we are deeply engaged in our social environment. We believe that personal well-being cannot be separated from the social and environmental context in which individuals live. Our commitment extends to corporate welfare initiatives aimed at promoting work-life balance for our employees, as well as ongoing support for local communities and associations. Our approach ensures that value is shared within the community. Bionike is highly committed to social issues within the community and the broader context in which it operates. The company frequently makes donations to hospitals and provides a significant number of products. The financial statements explicitly detail the monetary value of these contributions to healthcare institutions. During the COVID-19 pandemic we provided extensive product donations and financial support. We supplied hospitals with essential items such as hand sanitizers and creams for healthcare workers, who endured long hours wearing gloves. We support centers that provide assistance to women who are victims of violence, as well as those that accommodate mothers and children facing difficult circumstances. We also prioritize initiatives that promote positive social impact. This year, we actively foster female talent within our team, where women make up 75% of Bionike's workforce.We support centers that assist women who are victims of violence rather than those that provide aid to mothers and children in difficult situations. Our commitment to sustainability extends across all areas of our operations."

Federica Brunetti, ESG Manager

Purpose-Driven Business Model Alignment - *The purpose-driven business model transformation enables firms to strengthen their social, ethical and environmental bias. Moreover, it reinforces sustainable competitive advantage and resilience by aligning profit generation with broader societal and environmental goals.*

After formalizing its commitment to sustainability, Bionike has mainly undergone a transformation in some key dimensions of the Business Model, that is value proposition, activities, resources and partnerships. The company's value proposition is based on four core pillars: dermatological expertise and scientific innovation, high performance while respecting sensitive skin, Italian manufacturing with cutting-edge technologies, and a strong focus on sustainable formulations and packaging. Bionike is integrating sustainability into its supply chain by revising its key activities and resource management. In procurement, the company prioritizes sustainable raw materials and collaborates with suppliers to ensure the responsible sourcing of ingredients. It has also developed more sustainable formulations by reducing the use of microplastics and conducting biodegradability tests on rinse-off products to minimize environmental impact. To enhance operational efficiency and reduce waste, Bionike aligns production with sales network demand, optimizes stock levels, and prioritizes local suppliers to minimize environmental impact and transport costs. Furthermore, it seeks to reduce the environmental footprint of logistics by using European intermediaries for non-EU orders and subcontractors located near the production site. The company has also redesigned its packaging to enhance recyclability, incorporating recycled materials, eliminating non-essential components, and promoting recycling, reuse, and reduction strategies. Some product packaging has been innovated to be both compostable and recyclable. According to Sodalis Group strategy, Bionike monitors its carbon footprint to define reduction and mitigation plans. It has installed water recovery systems and currently relies on renewable energy sources. Additionally, its production facilities are equipped with advanced technologies that optimize resource management and improve energy efficiency.

"Sustainability is a key principle in all product launches and relaunches, influencing not only marketing strategies but also production processes. We are committed to continuously improving our overall environmental footprint. This is a daily effort that encompasses multiple areas, from packaging choices-developing eco-friendly solutions based on the principles of reduce, reuse, and recycle-to the adoption of renewable energy sources for our production processes, such as the installation of photovoltaic systems. For existing products, we continuously seek ways to improve their environmental impact, while new product development is guided by sustainability criteria. This includes formulation choices, sourcing raw materials from sustainable sources, and optimizing packaging-such as reducing paper use, eliminating plastic cellophane, utilizing certified paper, removing unnecessary outer cartons, and replacing paper inserts with QR codes. We are currently assessing our greenhouse gas emissions through a Carbon Footprint analysis, aiming to quantify both direct and indirect emissions. This evaluation will enable us to define concrete reduction and mitigation plans, identifying areas where we can effectively cut CO_2 emissions within production and across the supply chain. While it is not always possible to eliminate emissions entirely, we are committed to offsetting them where necessary. Furthermore, we are actively collaborating with all partners across the supply chain-both upstream and downstream-to measure emissions and implement targeted actions to reduce our overall environmental impact. Additionally, we focus on waste reduction, ensuring greater efficiency in waste management during production. Formulation choices are equally critical, with a strong emphasis on sourcing raw materials from sustainable origins. Bionike has been a pioneer in eliminating microplastics, well ahead of regulatory requirements. While legislation banning microplastics was introduced only some years ago, with phased implementation depending on product categories, we had already embarked on this complex and challenging transition in 2018-2019, proactively anticipating the regulatory developments."

Federica Brunetti, ESG Manager

For the future, the company aims to establish criteria for identifying the most sustainable partners and suppliers.

"Over the coming year, we will work on defining and establishing ESG evaluation criteria for our suppliers. Currently, when onboarding new suppliers, we conduct audits and assessments through our internal team, selecting partners based on geographic location and specific requirements. However, a formalized set of ESG evaluation criteria has not yet been implemented. Developing and integrating these standards into our supplier selection process will be a key focus for the future."

Federica Brunetti, ESG Manager

The company has engaged numerous partners in its sustainability journey. Its strong social commitment emerges from the several collaborations established with a broad spectrum of stakeholders, including associations, research institutes, dermatologists and scientific societies.

"As a brand, Bionike is highly active and committed to various initiatives, not only from an environmental perspective but also in the social and governance domains. The company collaborates with hospitals and supports centers that assist women who have experienced violence, as well as facilities that provide shelter for mothers and children in difficult circumstances. Additionally, Bionike is dedicated to supporting positive social initiatives. Over the past year, the company has funded research conducted by IEO Monzino and donated products to various organizations, including Centro Ambrosiano and associations supporting women affected by violence. Contributions have also been made to SOS Villaggio dei Bambini, a nonprofit organization assisting children whose mothers are victims of violence. Furthermore, Bionike is set to collaborate with Loto Onlus by donating makeup products for events dedicated to women undergoing chemotherapy. The company also supports Banco dell'Igiene, a nonprofit organization to which it donates hygiene products. The company adopts a comprehensive approach to sustainability, addressing multiple dimensions of social and environmental responsibility. A key aspect of Bionike's sustainability strategy is research. The company views sustainability as an integral part of innovation and actively fosters partnerships with dermatologists, research institutes, and scientific societies to enhance its formulations. From an environmental perspective, a particularly significant partnership is the collaboration with WorldRise, a nonprofit organization dedicated to the conservation of the Mediterranean Sea. Bionike has been working with WorldRise since 2022, and the partnership has been renewed for the current year, reinforcing the company's commitment to marine environmental protection."

Federica Brunetti, ESG manager

Purpose Alignment Driven by the Ecosystem - *The ecosystem plays a key role in the transformation process of Bionike's purpose-driven strategy. It includes multiple stakeholders who influence and support the company's transition. First and foremost, the Sodalis Group, to which Bionike belongs, has acted as a key driver of this transformation. As part of a larger corporate group, Bionike benefits from the opportunity to share performance insights and align with a common strategic direction within the group.*

"Being part of this group has facilitated the formalization of our sustainability journey. In 2023, at the group level, we officially committed to sustainability by defining a three-year ESG action plan for the entire Sodalis Group, encompassing all its subsidiaries. Within the group, some companies had already embraced sustainability practices, such as Bionike and our French subsidiary, L'Arbre Vert, which was founded with a strong natural and environmentally conscious identity. Other companies, like Deborah, have also integrated more sustainable practices over time, aligning with the group's overall strategy. As a group, we decided to implement a collective approach, ensuring that all companies

within the group adhere to this three-year ESG plan. For instance, Bionike's Carbon Footprint assessment was completed and ISO-certified last year. Given its strategic importance, the group has decided to extend this initiative across all its subsidiaries, both in Italy and internationally, to standardize and enhance sustainability efforts."

Federica Brunetti, ESG manager

Second, among stakeholders, consumers play a crucial role in that they demand transparent communication about corporate activities, particularly in relation to sustainability. They are very careful to avoid companies that engage in purpose-washing or greenwashing.

"The year 2023 marked a turning point, bringing our sustainability initiatives into concrete action and necessitating external communication of our efforts. As part of this process, we expanded the sustainability section of our website, which had previously been underdeveloped or nonexistent. We also published our first sustainability reports to formalize and reinforce our commitments. Additionally, we developed targeted communication strategies for both internal and external stakeholders to ensure transparency regarding our initiatives. Consumers today are particularly attentive to these issues, and sustainability has become a key driver in their purchasing decisions. Environmental impact, in particular, is one of the most significant factors influencing consumer choices. This presents a challenge, as it is now essential to communicate corporate sustainability actions accurately to avoid any perception of greenwashing. Special attention must also be given to the mode of communication, ensuring that stakeholders are informed not only about corporate sustainability initiatives but also about the specific environmental and sustainability benefits of individual products, such as their eco-friendly formulations."

Federica Brunetti, ESG Manager

Research limitations. *This study is not without limitations, which should be considered when interpreting its contributions. First, the empirical evidence is part of an ongoing research effort, and data collection-particularly through qualitative interviews-is still in progress. As such, the findings presented here are preliminary and should be viewed as provisional insights rather than definitive conclusions. Second, the study relies on a single-case design. While this approach enables an in-depth, contextually rich examination of organizational dynamics, it inevitably constrains the extent to which the findings can be generalized to other settings, particularly those characterized by divergent institutional logics, competitive pressures, or industry structures. Future research could address this limitation by incorporating comparative case studies or larger samples spanning multiple sectors and organizational forms, thereby enhancing external validity and analytical generalizability. Third, the study does not systematically investigate the antecedents, mechanisms, or contingencies that enable or inhibit organizational transformation, nor does it empirically assess its performance implications. These limitations offer fertile ground for future inquiry.*

Managerial implications. *From a managerial perspective, this study offers valuable insights for companies aiming to transition into purpose-driven businesses. First, in contrast to Lyon et al., (2024) and in line with Gionfriddo et al. (2024), it suggests that firms can adopt a purpose-driven orientation without initially being certified or formally classified as hybrid organizations, with the possibility of institutionalizing their sustainability commitment at a later stage.*

Second, the study outlines a potential pathway for firms seeking to integrate environmental and social objectives alongside economic goals. This transformation begins with the articulation or reformulation of a corporate purpose that explicitly aims to generate both environmental and social value in conjunction with economic performance. It then proceeds with the alignment and integration of the company's overall philosophy, including its strategy, mission, vision, and core values (Jimenez et al., 2021; Rey et al., 2019; Carballo, 2023; George et al., 2021), as well as the key dimensions of its business model (Osterwalder & Pigneur, 2011; Kropfeld & Reichel, 2024; Ernst et al., 2023).

Finally, the study underscores the strategic relevance of organizational embeddedness within a broader ecosystem, which can significantly shape and support the transformation process itself (Sebhatu & Enquist, 2022; Rey et al., 2019).

Originality of the paper. *This paper offers original insights to the emerging literature on purpose-driven businesses by focusing on the transformation of traditional firms toward purpose-oriented models. To the authors' knowledge, limited research has explored this transition as a systemic process that integrates sustainability by leveraging the interplay between a firm's internal foundations and its external stakeholder environment.*

The study conceptualizes transformation as emerging from the organizational core-rooted in its strategy and business model-while underscoring that its full enactment requires active engagement with the broader ecosystem in which the firm is embedded.

By synthesizing the key drivers of this transformation, the paper advances a more integrated understanding of how companies can effectively operationalize purpose. The insights generated can inform both companies undertaking purpose-driven change and policymakers seeking to create enabling environments for responsible business transformation.

Key words: *purpose; purpose-driven businesses; business transformation; strategy; business model transformation; ecosystem*

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The relevance of biodiversity practices for business: A purpose-driven perspective

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Abstract

Biodiversity loss is a serious risk for society as well as for business. As consequence, organizations are introducing new frameworks based on new services to reduce the effects of their business activities on the environment to protect biodiversity. Due to these relevant global changes, entrepreneurs and managers have started to adopt more inclusive and socially responsible strategies. In this context, purpose-driven organizations that pay more attention to the sustainable use of natural resources and adopt a people-oriented approach are emerging. In this sense, a key role could be played by stakeholders, from business partners to clients, that can support the company' strategies in pursuing sustainable goals, such as biodiversity. The implementation of biodiversity practices might affect business processes, pushing companies to innovate products and services as well as to promote the innovation of business models to reach and satisfy new market needs. Through a multiple case studies approach, the study tries to assess from a purpose-driven perspective, how companies implement biodiversity practices and what are the effects of biodiversity on business. The results of analysis emphasize the relevance of both stakeholders as well as of digital technologies and culture for biodiversity goals and of biodiversity for innovation.

Keywords: *biodiversity, purpose driven business, stakeholder theory, digital technologies, innovation*

Framing of the research. *In the field of environmental sustainability an important issue concerns the prevention and promotion of biodiversity (Jones and Solomon 2013). Biodiversity loss poses serious risks to business operations, threatening resource availability, supply chains, and ecosystem services, which is has been defined as the benefits that human populations and organizations derive-directly or indirectly-from proper ecosystem functioning (Costanza et al., 1997; Whiteman et al., 2013). As consequence the role of businesses in the economic system is profoundly changing. Organizations are introducing new frameworks (mainly based on new services) and (new digital) tools to reduce the impacts of their activities on the environment and protect biodiversity (Reale et al., 2019). Due to these recent global changes, businesses and entrepreneurs have started to adopt more inclusive and socially responsible strategies. In this context, purpose-driven organizations are emerging. Such organizations focus their strategies and actions on the needs of society and pay more attention to the sustainable use of natural resources, adopting a people-oriented approach in their activities (Hollensbe et al., 2014). Purpose-driven companies offer an unprecedented way of functioning as "purpose" is at the heart of its activity and business model, and it aims to profoundly transform the nature of performance (George et al., 2023).*

Purpose-driven organizations hold the ambition to put their economic model and their search for profit at the service of a social or environmental goal (George et al., 2023). A purpose-driven model reflects three essential organizational components: (1) why an organization exists (purpose logic), (2) which it is (purpose identity), and (3) what it does (purpose strategy). These components represent a human-centered, relational, and anthropomorphized view of the organization and its work (Sluss and Ashforth, 2007). A purpose-driven organization offers products and services with the aim of solving societal problems and responding to people's needs rather than only having the objective of making profits. In this regard, a purpose-driven firm focuses the marketing vision on the fusion between purpose and profit, which requires changes in policies and practices, such as: (1) extending the company's key stakeholders beyond customers, (2) try to balance diverse and conflicting goals, also through the use of digital technologies, (3) developing (new) marketing strategies that support purpose-driven brands (Blocker et al. 2024).

Contributing to this topic, a growing number of scholars and practitioners are recently looking at managing sustainability and biodiversity issues by considering the role played by stakeholders (Bronzetti et al., 2023) respect the activation of sustainable business solutions that could positively affect biodiversity practices (Henriques and Sharma, 2005). Specifically, for biodiversity practices, scholars refer to the activities that can help to tackle the loss of biodiversity (Salmi et al., 2023). Boiral and Heras-Saizarbitoria (2017) proposed a framework that differentiates biodiversity

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practices into: (i) internal practices that are implemented by the firm itself; and (ii) external practices implemented in association or collaboration with various stakeholders.

Another important aspect in motivating operational practices to tackle biodiversity issues is linked to the diffusion of ecological knowledge. Specifically, ecological knowledge is vital in influencing biodiversity culture and shaping learning about biodiversity in the social context. Stakeholders are integrated into this learning process (Smith et al., 2020) because of their key role for value co-creation (Boiral and Heras-Saizarbitoria, 2017). According to stakeholder theory, in developing their overall strategies, companies and organizations must consider the interests and expectations of their various stakeholders, defined as "any identifiable group or individual who can affect the achievement of an organization's objectives, or who is affected by the achievement of an organization's objectives" (Freeman and Reed 1983, p. 91). Some studies have highlighted the importance of stakeholders' engagement and involvement in managing complex environmental issues and promoting proactive environmental strategies (e.g., Buysse and Verbeke 2003; Cragg and Greenbaum 2002).

In addition to stakeholders, also digitalization plays a key role in managing sustainable goals (Broccardo et al., 2023). Emerging digital technologies may lead to variations in how organizations involve stakeholders in sustainable practices. Indeed, in the last years, there has been growing attention on how digital technologies (especially the new ones included in the Industry 4.0 paradigm) are supporting organizations in the processes optimization, including environmental sustainability concerns (Piccarozzi et al., 2022, 2023). Digital technologies can serve as solutions for facing biodiversity issues in different ways, as they can be used to offer innovative regenerative solutions in agriculture (Cumming et al., 2020), but also to tackle biodiversity loss playing a complementary role alongside existing technology, or supporting other innovation processes (Ziegler et al., 2022).

The connection between biodiversity (from a purpose-driven perspective) and innovation emerges as a promising field of work. In fact, some scholars (Henderson 2021; George et al. 2023) argue that purpose-driven firms are better suited to introduce innovations thanks to the aim of improving environment and human well-being. In other words, purpose-driven businesses might outperform other businesses in various fields, including innovation, and also better contribute to society (George et al. 2023).

Pursuing biodiversity goals from a purpose-driven perspective could affect business innovation, in terms of processes products, services and business models. In the management literature, it has been found that different forms of diversity, such as gender, culture, education, background and cognitive (Mitchell, 2008; Østergaard et al., 2011), as well as the diversity of cooperation and relationships among companies and stakeholders (Vence and Trigo, 2009) have positive effects on innovation processes. Diversity is considered a driver of innovation (Hewlett et al., 2013). In the context of sustainability (and biodiversity), companies have started to innovate their business models to include also environmental and social considerations (Feger and Mermet, 2022). These sustainable business models are designed to integrate sustainability into companies to create also ecological and social values, to adapt the firm to the changing external environment. This perspective will drive the next wave of innovation and growth in the global economy and will also contribute to reshape businesses and the relationships with society (Porter and Kramer 2019).

Purpose of the paper. *Despite the relevance of biodiversity for business and society, there is a lack of studies that explore how it relates with business. The main purpose of the study is to identify new theoretical patterns (Sabherwal and King, 1991) about how biodiversity is dealt with by companies and how it can be related to innovation from a purpose-driven perspective. We attempt to reach our research goals by selecting "information-rich" cases (Patton, 2015), summarizing varied or extensive raw data, establishing relationships between findings and research objectives and developing a theoretical framework based upon "the underlying structure of experiences or processes that are evident in the text data" (Thomas, 2006, p. 238). Specifically, through our study we aim at answering to the main following research questions:*

RQ1: How do companies implement biodiversity practices?

RQ2: What are the effects of biodiversity practices on business?

RQ3: What are the effects of biodiversity practices on innovation?

RQ4: Does and how the pursuing of biodiversity goals allow companies to affect positively innovation?

The purpose pf the study is to identify new theoretical patterns (Sabherwal and King, 1991) about the relationships between biodiversity and business innovation. We attempt to answer the study's research questions by selecting "information-rich" cases (Patton, 2015), summarizing varied or extensive raw data, establishing relationships between findings and research objectives and developing a theoretical framework based upon "the underlying structure of experiences or processes that are evident in the text data" (Thomas, 2006, p. 238).

Methodology. *Because of the exploratory nature of our research, we adopted a bottom-up inductive approach (e.g. Gioia et al., 2013; Thomas, 2006) "wherein theories are formulated by drawing general inferences from particulars or cases of empirical data" (McAbee et al., 2017, p. 278). In doing so, the qualitative method through a multiple case study approach (Yin, 2014) using multiple material sources from in-depth interviews to secondary company's data extracted online (companies' websites and companies' LinkedIn webpages), is the more suitable for a deeper first understanding of the phenomenon. This is a preliminary version of the research that aims at analyzing data coming from different companies of different industries that consider biodiversity goals into their business strategy. Currently we have collected data about five different Italian companies detailed in Table 1.*

Company 1 is a medium-sized leading nature-tech company aiming at favoring biodiversity through technology. The company's goal is to create Europe's largest ecological corridor, consisting of interconnected biodiversity oases, to restore 40% of global biodiversity. The honeybee is a key bioindicator that Company 1 assesses by collecting and interpreting data through innovative proprietary systems to monitor the health of bees, pollinators and their connection to ecosystems. Biodiversity is an integral part of the business.

Company 2 is a medium-sized digital company mainly focused on (healthy) food production (recipes) and delivery. It's main goal bases on the idea that delivering the "right quantity" of ingredients for the different dishes and recipes an individual chooses to eat can totally eliminate food waste and, consequently, having a positive impact on nature. Indeed, the company's desire is to have a positive sustainable impact on the entire ecosystem to sustain nature and protect biodiversity, which is important to offer several ingredients for its own customers.

Tab. 1: Case studies

Company	***Founded***	***Size (employees)***	***Industry/Activity***	***Interviewed***
Company 1	*2017*	*Medium-sized*	*Technology provider; Consulting*	*Marketing manager*
Company 2	*2019*	*Medium-sized*	*Food delivery services*	*Co-founder*
Company 3	*2018*	*Medium-sized*	*Innovation and technology business consulting services; Training services*	*Marketing manager and Agronomist*
Company 4	*2022*	*Small-sized*	*Bio-technology solutions*	*Co-founder*
Company 5	*2019*	*Small-sized*	*Health food production*	*Founder / Marketing manager*

Source: Authors' elaboration

Company 3 is a medium-sized tech-company that offers several consulting services for businesses and other organizations with the aim of transforming territories and industrial districts into sustainable places, safeguarding the environment by saving resources, combating climate change and valuing biodiversity. In this case, biodiversity is strategically relevant for the company's business.

Company 4 is a small-sized innovative start-up that offers bio-solutions and in particular molecules of plant origin for dermo-cosmetic and pharmaceutical use, obtained by innovative patented biotech processes that are gentle, respectful and low energy. Pure active ingredients with proven efficacy, generated thanks to the know-how of the research team and the constant and valuable collaboration with Italian universities and public research institutions. Biodiversity has a strategic and business value.

Company 5 is a small-sized company operating in the food industry that makes available, through the application of natural biotechnology, functional fibers and antioxidants that are already present in nature. Company 5 looks for sustainable solutions to naturally improve nutrition today conditioned by wrong patterns and ultra-processed foods. Their mission is to protect people's health and preserve the environment, thus biodiversity is the core of business.

We performed two steps of analysis: a preliminary desk analysis of companies' website and LinkedIn webpage and a content analysis of the interviews done to extract common concepts useful for our research goals. We interviewed marketing managers and co-founders (with marketing competences) because of our interest in the market perspective of the phenomenon. The interviews aimed at investigating the link between business and biodiversity, the firms' activities (practices) adopted for biodiversity goals, and the effect of these practices on innovation.

Results. *The evaluation of the five companies started with the desk analysis of company's website and LinkedIn webpage to assess what they do, in terms of activities, and how biodiversity is part of the business. A summary of the main results of the desk analysis that can allow us to have some preliminary insights related to our research goals is reported in Table 2.*

Company 1 bases the business on 3 main pillars (services): (1) the monitoring through technologies of the nature habitat health (data on pollinators, bees, flora, etc.); (2) regeneration of low-biodiversity lands, providing nectariferous species of trees and plants, selected according to the specific characteristics of the land; and (3) education programs to raise awareness of biodiversity issues among businesses and communities. Moreover, Company 1 provides additional services, such as education. In this regard, through LinkedIn, it publishes news and information as well as webinars about biodiversity. On the company's website there is a blog and a podcast supported by various business partners to spread the culture of biodiversity. Finally, Company 1 offers to the citizens, the possibility to "adopt" a beehive (monitored through the app) managed by beekeeper that periodically send the honey produced by the "adopted" bees. In addition, there is also the opportunity to "adopt" a solitary bee house, and a nectariferous tree. For these two kinds of activities, Company involves different stakeholders, such as beekeepers, landowners, research centers and universities, and other business partners, as well as citizens in pursuing biodiversity practices.

Company 2 is a digital company offering a new way of sustainable grocery shopping (health food). The kits are provided in compostable containers of portioned, ready-to-cook ingredients that allow to have zero food waste at a sustainable cost. It offers a large variety of ingredients to ensure the possibility of cooking several different recipes for several different cultures (people). In doing so, Company 2 creates synergies with host territory, involving various stakeholders (producers, bistros, restaurants, pick-up points, etc.) with the intention of enhancing and protecting biodiversity as key factor of the ecosystem. The main goal is to optimize resources and reduce waste, generating a real change to protect "People, Work and the Planet". In addition, to support clients, Company 2 has partnered with nutrition

experts (biologist nutritionists) who will provide a personalized diet plan designed on client needs. A highly personalized service, new to the market, flexible and tailor-made that favors collaborations with several different actors in the food industry. In this way, Company 2 reduces food waste with positive effects on environmental sustainability and on the prevention of biodiversity loss. Moreover, Company 2 is also active on promoting, also through the involvement of other actors (partners, universities, etc.) the culture of sustainability and biodiversity mainly through the LinkedIn page, by publishing news on these topics.

Tab. 2: Main results of desk analysis

Company	***Products/Services***	***Collaboration strategies***	***Digital tools for biodiversity practices***
Company 1	▪ *Monitoring* ▪ *Regeneration* ▪ *Education* ▪ *Innovative service for citizens: adopting a beehive / tree / bee*	▪ *With their clients to control bees' life* ▪ *With other organizations (universities and research centers) to develop new solutions* ▪ *Involvement of the clients of their clients*	▪ *IoT* ▪ *Sensors* ▪ *Satellite imagery* ▪ *AI* ▪ *App*
Company 2	▪ *Food production (recipes) and delivery for individuals and organizations* ▪ *Personalized nutrition*	▪ *With suppliers to assure ingredients variety* ▪ *With other organizations (universities, research centers and consultants) for technical aspects*	▪ *Digital platform,* ▪ *App (for service delivery, for personalized nutrition, for B2B relationship)*
Company 3	▪ *Nature-based solutions* ▪ *Local and industrial resource efficiency solutions services* ▪ *Biodiversity monitoring and innovative regeneration services* ▪ *Open Innovation* ▪ *Venture Capital*	▪ *Involvement of clients to favor biodiversity practices and promote them in the client's network.*	▪ *Sensors* ▪ *Satellite imagery* ▪ *Virtual collaboration tools*
Company 4	▪ *R&D and production of science-based and plant-derived active ingredients for the Personal Care and Health Care markets.*	▪ *Very important collaboration with research centers, universities and other organizations (mainly consultants) for the development of innovative solutions*	▪ *Smart production technologies instrumental for the business based on biodiversity*
Company 5	▪ *Production of functional fibers and antioxidants for health food that are already present in nature.*	▪ *With different organizations (from business partners to universities, research centers and consultants) to develop innovative solutions*	▪ *Smart production technologies instrumental for business biodiversity-based* ▪ *Digital platform*

Source: Authors' elaboration

Company 3 is a tech-company that provides nature-based consulting solutions, including its own technologies, to improve environmental sustainability reducing the use of natural resources. This is done to address major critical environmental issues and provide resilience to the Planet of the Future. Company 3 develops and aggregates technologies, solutions, innovations and skills to transform the industrial supply chain and territories into resources for people and the environment, in order to combat the scarcity of natural resources by limiting their extraction and promoting the reuse of those already present, promote the regeneration of biodiversity and counter climate change, creating a true circular symbiosis between people, economy, business and the environment. Company 3 activity starts with the analysis of an actor's needs and tries to involve all the main client' stakeholders into the project. In this case, it aims at creating a superior value for sustainability and biodiversity goals. Company 3, like the other two ones, uses the LinkedIn page (with the participation of different other actors) to promote the culture of sustainability and biodiversity through the publishing of information and events on the topics.

Company 4 is a bio-technology innovative start-up mainly focused on the development and production of science-based plant-derived active ingredients for the Personal Care and Health Care markets. Company 4 believe that combining expertise and networking with Italian research excellence produces the best results. For this reason, it considers (all) stakeholders particularly important for the business and the purposes of the business. Through a close integration of activities involved in the supply chain, Company 4 recovers plant residues from selected organic crops in a process of continuous collaboration among different partners, with the ambition of generating even more effective products than the reference product. For Company 4, the best projects arise from the complementarity of skills and the active and inclusive involvement of all partners, but also from an open approach to the needs of the client. Active ingredients for cosmetics designed and tailored for clients seeking exclusivity and innovation. Company 4 uses company's LinkedIn account to promote the concept of biodiversity and its positive effects on life and individuals.

Company 5 is focused on delivering on the market health food by providing sustainable solutions to naturally improve nutrition today conditioned by wrong patterns and ultra-processed foods. The Company's mission is to protect people's health and preserve the environment. Through the application of natural biotechnology, Company 5 develops innovative foods and supplements with high nutraceutical value. In doing so, Company 5 collaborates with different partners. Moreover, with their patented technology, Company 5 is rewriting the future of the food industry, addressing

environmental and biodiversity challenges with sustainable solutions in harmony with the circular economy. Social media is used to spread culture about biodiversity.

In addition to the desk analysis of companies' website and LinkedIn pages, we analyzed the interviews done with managers and a co-founder of the five companies considered in this study. The content analysis of the interviews done allowed us to have some in-sights into our research goals. Firstly, all companies consider tackling biodiversity issues as a key purpose of the business.

"We perceived the key value of biodiversity for society and focused our business activities on this perspective." (Company 1)
"Biodiversity protection and promotion is a key aspect for our business because it allows to satisfy a large variety of customer needs." (Company 2)
"When we interact with our clients, we highlight the relevance that Nature Based Solutions for resource efficiency have for biodiversity and how it is important for society." (Company 3)
"Today there is the necessity and responsibility to face environmental is-sues. We cannot do business without this purpose." (Company 4)
"The ethical aspect related to the negative effects of mass production on biodiversity has changed the way we do business." (Company 5)

As far as the role of stakeholders for biodiversity issues is concerned, through the analysis of interviews emerged that without the involvement of stakeholders is difficult to reach sustainable and biodiversity goals, because of the complexity of these topics.

"In addition to our clients, also citizens are directly involved in the business because of the relevance of biodiversity. Moreover, we collaborate with different research, universities and other institutions." (Company 1)
"In our business we need of the involvement of other organizations and of clients." (Company 2)
"Biodiversity needs of stakeholders' involvement. Biodiversity loss is a social issue that needs the participation of different actors." (Company 3)
"We have to involve stakeholders and institutions and share with them culture of bio-solutions to reach sustainable goals." (Company 4)
"Everyone has to participate actively. For example, scholars are useful to doing outreach to affect the culture." (Company 5)

In addition to stakeholders, from the content analysis of interviews emerged two other factors that could be relevant for the management of biodiversity practice/issues. Specifically, companies stressed the role of both digital technologies, currently essentials to monitoring, preserving and promoting biodiversity, as well as of culture, which is essential to understand the relevance of biodiversity for society.

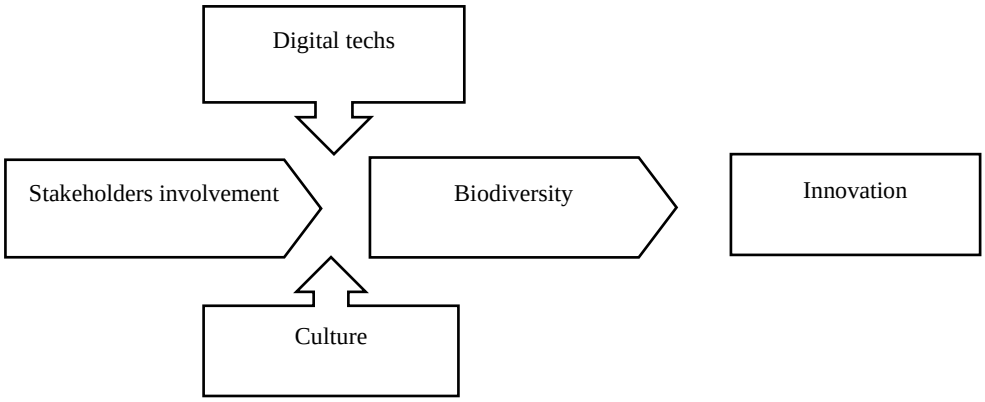
"To provide our services we need technology and data to precisely meet need of beekeepers as well as of individuals that adopt a beehive…Technology is for us necessary to assure biodiversity." (Company 1)
"In promoting our Nature Based Solutions, we consider technologies necessary to reach efficient sustainable results. Moreover, technologies allow us to monitor biodiversity and act immediately." (Company 3)
"Culture is important. Understanding the relevance of biodiversity affects the social approach to the topic." (Company 5)

Finally, through interviews we aimed at exploring the effects of biodiversity on business. Interestingly, we found that biodiversity positively affects innovation.

"When we noticed that people were interested in biodiversity issues, we basically modified our business model to involve individuals." (Company 1)
"Biodiversity allows us to satisfy different people needs. In this way we can innovate our business also promoting personalized nutrition." (Company 2)
"In our solutions, we offer to the clients the opportunity to innovate the business models." (Company 3)
"Biotechnology can certainly be an extraordinary lever of innovation to face biodiversity issues." (Company 4)
"Offering bio-solutions is very innovative because probably these situations could have been addressed with chemical or other industrial solutions." (Company 5)

The results of desk and content analyses of the five companies here considered allowed us to depict a possible conceptual framework (Figure 1) that summarize how the different variables relate among them, highlighting the double face of biodiversity promotion or loss prevention, as output of innovative services and a driver for innovation.

Fig. 1: Theoretical framework proposed



Source: Authors' elaboration

Research limitations. *The study has some limitations that could be thought as hints for the future research. Firstly, the study is based only on the analysis of five companies. More case studies belonging to different industries can improve the understanding of the phenomenon. Moreover, the study is based on a qualitative exploratory analysis. A more comprehensive stream of research that considers a quantitative approach and other variables in addition to those reported in Figure 1, such as culture, is needed to better understand cause-effect relationships among the different variables.*

Managerial implications. *Although this is only a preliminary step of the study, it has different implications for companies and policymakers. Firstly, a purpose-driven perspective is the right approach to manage biodiversity in the business context. In doing so, companies should consider the involvement of stakeholders to foster the process of transition towards sustainable and purpose-driven businesses that favor biodiversity and, as consequence, business innovation (products, processes and business model innovation). The involvement of stakeholders leads to an integrated strategy that accelerates the process of transition towards sustainable businesses that favor biodiversity (Leclère et al., 2020). Moreover, companies should consider the use of digital technologies (various kinds of technologies for various kinds of activities and purposes) to reach positive results in terms of biodiversity protection and promotion. Digital technologies allow to favor the development of an efficient ecosystem of services (preventing, monitoring but also promoting) needed for biodiversity (Pimm et al., 2015). By reaching biodiversity goals, companies hod to innovate their own business model, as well as products and services, to reach both business and individuals' needs.*

Finally, the results of analysis highlighted the relevance of culture for this kind of topic. Culture is a cross-sectional factor that affects all the linkages of the different variables analyzed with biodiversity. In this sense, policymakers should contribute to improve the social context, not only through rules and regulations, but also through promotion policies for organizations and citizens to favor learning about biodiversity. Social learning describes the process through which new ecological knowledge translates into business (Siebenhüner and Arnold, 2007) and social actions (Siebenhüner et al., 2016) regarding biodiversity.

Originality of the paper. *The research is one of the first studies that aims at assessing how biodiversity relates to business innovation from a purpose-driven perspective. Based on a multiple case studies approach, the study theoretically introduces a new framework that highlights the double role of biodiversity as output of innovative services mostly developed through the involvement of different stakeholders, and as driver for business innovation. Moreover, the study highlights the relevance of both digital technologies and culture. In this sense, policymakers should support companies in adopting the digital technologies needed to handle biodiversity as well as foster activities to promote the biodiversity-based culture.*

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When the Lights Go Out: Orchestrating Social Innovation with Hybrid Funding

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Abstract

In recent years, social innovation has emerged as an important strategy for addressing complex urban and societal challenges, involving diverse actors from the public, private, and nonprofit sectors. Within this dynamic context, the concept of orchestration - defined as the coordination and alignment of multiple actors towards a common goal - has gained increasing relevance, particularly in multi-stakeholder initiatives focused on urban regeneration. However, empirical understanding of how orchestration unfolds in practice within social innovation projects remains limited.This study explores how orchestration is enacted in multi-stakeholder social innovation projects by examining urban regeneration initiatives in Italy. Using a multiple case study approach, we analyze six projects that differ in their governance models, initiating actors, and funding sources. The research is ongoing. To date, we have conducted six in-depth interviews with key actors involved in these initiatives, allowing us to draw preliminary conclusions about orchestration practices. Early findings suggest that orchestrators play a central role in articulating shared goals, building trust, navigating power imbalances, and adapting governance structures over time to sustain collaboration.

Framing of the research. *Social innovation has become an important approach to addressing grand societal challenges that transcend sectors, geographies, and communities. Social innovation creates novel processes, services, or products to solve social problems for collective benefit (Beckman et al., 2023). Examples include microcredit programs in India (Sheikh et al., 2023), public innovation hackathons in Germany (Mair, 2018), and healthcare models leveraging the unique skills of visually impaired individuals (Bouchard, 2012). These initiatives highlight the potential of social innovation to generate systemic change and foster inclusive progress. However, realizing this promise requires collaboration among diverse actors, including businesses, governments, and civil society organizations.*

Cross-sectoral collaboration plays a critical role in creating systemic transformations. For instance, coordinated efforts between pharmaceutical companies, public authorities, and nonprofits were instrumental in the global response to the COVID-19 pandemic, facilitating vaccine development and distribution that saved millions of lives (Bacq & Lumpkin, 2021; Cabral, 2024). Similarly, partnerships between firms and civil society organizations have successfully reduced deforestation, improved community well-being, and generated economic benefits for businesses and underserved stakeholders (Barnett et al., 2020; Gatignon & Capron, 2023; McGahan & Pongeluppe, 2023). These cases underscore the necessity of multi-stakeholder collaboration in addressing grand societal challenges effectively (Dentoni and Bitzer, 2015). And in some cases, this responsibility relies on the shoulders of the orchestrators. Orchestration as a theoretical construct highlights the role of central organizations, or anchor firms, in establishing a new value creation meaning for a network of actors (Dattée et al., 2018; Jacobides et al., 2018) Orchestration focuses on aligning diverse actors and is therefore often used to explain ecosystem dynamics which involve participants with technological, economic and cognitive interdependencies for value creation (Nambisan et al., 2019; Williamson and de Meyer, 2012).

The orchestration of social innovation ecosystems is essential for their success. Due to the collaborative nature of social innovation and the complexity imposed by the context, several stakeholders-instead of individual leaders-may play a vital role in orchestrating collaborative networks (Wegner et al., 2023). To orchestrate can be defined as the ability to effectively build, manage, govern and adapt networks for social change (Busch and Barkema, 2019). An organization, alliance, or collective of entities typically orchestrates by facilitating coordination, mediating power dynamics, and aligning diverse goals (Mair et al., 2023; Porter et al., 2020). However, power imbalances and competition within multi-actor collaborations often hinder progress, heightening the risk of conflict and relationship breakdowns (Baker et al., 1998; Gulati & Gargiulo, 1999). Policies designed to promote ecological sustainability can inadvertently exacerbate social inequities or disempower certain stakeholders (Avelino, 2021). These challenges underscore the need for deeper inquiry into how actors collaborate, coordinate, and cooperate in social innovation projects.

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Despite these notable examples, management scholarship often falls short of capturing the complexity of such collaborations. Existing literature prioritizes free-market solutions or the business case for collaborations such as leveraging relationships with public or civil society organizations-while overlooking the broader societal challenges these partnerships aim to address (Cabral et al., 2019). Furthermore, significant gaps remain in understanding how contextual factors, stakeholder heterogeneity, and the characteristics of social problems shape the orchestration processes critical to effective collaboration (Wegner et al., 2023).

Purpose of the paper. *This article contributes to the growing body of literature on the orchestration of multi-stakeholders' collaboration for social innovation. By examining how the orchestrator navigates power dynamics, aligns objectives, and fosters collective impact, the study addresses critical gaps in understanding the operationalization of multi-actor partnerships (Bellandi et al., 2021; Bacq & Eddleston, 2018). The central research question guiding this study is: How do orchestrators manage multi-stakeholder social innovation projects in the context of urban regeneration? This study seeks to advance theoretical understanding while offering practical insights for stakeholders committed to addressing today's pressing societal challenges.*

Methodology. *A multiple case study approach was employed to systematically and comprehensively analyze the orchestration in a social innovation project, allowing the development of clearer and richer insights into the phenomenon (Yin, 2014). This case will analyze six social innovation projects connected to the purpose of urban regeneration and development of communities, orchestrated by different organizations, according to Table 1.*

The case selection process followed Siggelkow's (2007) recommendation to find cases that maximize learning opportunities. We looked, therefore, for projects that meet the following criteria: (a) projects developed by their members to produce social innovation through the collaboration of multiple actors; (b) projects that involve different categories of stakeholders, namely public, private, civil society, and NGOs; (c) cases that are a meaningful learning opportunity about the general pattern of collaborative networks for social innovation.

This study is focused on the Italian context of social innovation projects focused on urban regeneration. The context was chosen because Italy faces many social and economic challenges, such as the low ratio of young people in the total population, challenges with immigration and high rates of unemployment (ISTAT, 2024). Moreover, this is also in line with the goals of the Italian Ministry of University and Research, as they defined a "Social Innovation Policy agenda" in 2012 and can generate insights for academic research for exploring the connection between innovation policy and social innovation initiatives (Calderini et al., 2023).

The data collection phase will occur in two different phases. The first focuses on secondary data on the company's website and reports, business cases, and academic studies. The second phase refers to qualitative data collected from interviews to ensure the validity of the findings, which will be triangulated to confirm the validity and increase the robustness. In projects 1,2 and 3, the first author also took part in the company's routines, talking with other employees and understanding more about the projects. So, field notes related to these projects are also helpful and are part of the study. In Table 1, there is a list of all the projects that this project is focused on.

Projects	***Location***	***Name***	***Responsible***	***Goal***	***Data***
Project 1	*Rome*	*Officina Mezzogiorno*	*Italiacamp Srl*	*Innovation and Social Regeneration Hub*	*Project Manager* *CEO of the company* *Communities Manager* *President of the Board of the Association*
Project 2	*Milan*	*Milano Luiss Hub*	*Nonprofit Organization*	*A multipurpose center repurposed from an old disused workshop*	
Project 3	*Rome*	*Opificio*	*Italiacamp Srl*	*A place of urban regeneration aligned with the organization's mission to create social impact and positively influence the territory and community in which it operates.*	
Project 4	*Bréscia*	*Casa del Parco Adamello*	*Avanzi Discover*	*Territorial regeneration and enhancement of local resources and energies through the activation of spaces.*	*Responsible area for impact assessment* *Community Manager*
Project 5	*Fermo*	*SpazioBetti*	*Avanzi Srl*	*Welfare and social inclusion; Training, guidance, and employment; Culture and social engagement.*	*Researcher on Urban development*
Project 6	*Torino*	*Cascina Fossata*	*Sharing Srl*	*In the former Olympic Village of Turin, social housing*	*Facility Manager*

Results. *From the preliminary interviews, it was possible to categorize the projects according to the different types of financing and the leading actor orchestrating the project, as shown in Table 2. Four of the six projects were funded by specific programs such as the Social Innovation Fund. This fund supports innovative models that address emerging social needs through the involvement of private sector actors and financing, following the principles of impact finance. For example, Spazio Betti, led by the Municipality of Fermo, involves partners such as NuovaRicercaAgenziaRES and Avanzi spa SB, with private funding from Banca Popolare Etica.*

Officine Mezzogiorno, coordinated by the Municipality of Lecce, involves partners such as Italiacamp and The Qube, with Ferrovie dello Stato Italiane S.p.A funding. Milano Luiss Hub is a collaboration between the Municipality of Milan, LUISS University, Fondazione Brodolini, and Italiacamp. It is driven by public-private cooperation but not by a specific public call.

Cascina Fossata is a redevelopment initiative managed by Società Sharing and financed by FASP - Fondo Abitare Sostenibile Piemonte, with contributions from banking foundations such as Compagnia di San Paolo and Fondazione CRT, as well as Cdp Investimenti Sgr. It includes collective housing, hospitality services, educational spaces, cultural

activities, and a public garden. Private investment has been central to the projects of Casa del Parco Adamello, where Avanzi Discover created a benefit corporation for project management, and Opificio, supported by Horizon Real Estate with financing from Alba Leasing and BPER Banca, owned and coordinated by Italiacamp SRL.

Tab. 2: Comparison of typology of partners between the projects

Project	Typology Partner	Typology finance	Instrument
Officine Mezzogiorno	67% non profit 33% for profit	SpA	SIINC (Social Impact Incentives)
Spazio Betti	67% non profit 33% for profit	Bank	Concession
Opificio	100% for profit	Bank	Agreement
Casa del Parco Adamello	83% non profit 17% for profit	Benefit Corporation	Concession
Milano Luiss Hub	100% for profit	Foundation	Public-private cooperation
Cascina Fossata	83% non profit 17% for profit	Bank	Real estate investment trust

In the interview with the projects where most of the partners are from non-profit, some keywords emerge from the interview, highlighting their understanding of the project and their experience in the project. In the non-profit projects, the municipality plays a key role in facilitating the initiative, particularly in cases where the property is publicly owned. In such instances, legal and administrative actions are required to transfer rights from one party to another. Besides property rights, another concern is the financial model and the project's inability to receive financial support. Table 3 presents interview quotes, keywords, and preliminary first-order codes.

Table 3 - Preliminary analysis of the quotes

Quotes	Keywords	First-order code
"Once the spotlights fade from the project, I often see that we are not exactly forced to act, but we do it anyway. We do it because financial resources drive us. Ultimately, that's the reality-associations, groups, and organizations need money to keep going."	Financial Resources drives the project	Financial Support over time
"There are law enforcers, local governments, especially municipalities, that have programs related to your money generation. "	Local government programs	
"I think welfare ecosystems are specific foundations, and we think especially of most bottom-up actors. We also work with real estate companies, and they come from other reasons."	Investment ability	
"I know they offer more money, instead of ideas."	Offers money	
You see, the municipality is the beneficiary of the fund, that is, the municipality that makes the application to receive this funding. And then there is an implementing body.	Beneficiary of the fund	
"I see it's very often a risk now in our welfare model, or where everything is much more based on tenders. When the money is over, everything is over."	When the money is over, everything is over.	
"But, indeed, mistakes were also made in terms of the people's skills in the initial team, that is, there was a big imbalance between the operational side and the operational needs."	Imbalance in the team	Intellectual Capital of the team
"Of how to balance a little bit the engagement side of the story, to being economically resilient and stable."	Team Development	
"Especially in this project, where we made the agents besides the consultants, it happened. I think that there were some conflicts in terms of actors."	Conflict between actors from different backgrounds	
"It helped with the relational capital that they could set up. And then the local partnership was also strong."	Relational Capital	

Other first-order codes that appeared in the projects on the non-profit side were team dynamics, especially regarding the necessary skills to develop the project. In a few instances, it was the case of challenges and imbalance of the team, where the role of the orchestrator is to balance and act. This is aligned with earlier research by Grabski-Walls and Ambos (2024), which says that orchestrators work with ecosystem participants to enhance ecosystem capabilities through brokering activities that ease identity tensions and amplify resource tensions, building the resources needed to tackle social challenges.

Research limitations. *It is important to note that this study is part of an ongoing project and will continue to evolve. As more data is collected and further analysis is conducted, new conclusions and insights will emerge, adding to our understanding of how orchestrators can manage social innovation and overcome challenges such as contextual factors, stakeholder heterogeneity, and the characteristics of social problems.*

Managerial implications. *This study provides broadly applicable insights beyond exchanges as orchestrators and extends to other contexts. It addresses urban challenges and explores collaboration opportunities across different funding models. Our findings show that central organizations can initiate change and encourage participation without abandoning their profit-oriented approach. The multi-level process model highlights how orchestrators introduce collective tension management to address grand challenges better. Moreover, it offers insights into maintaining projects over time. Furthermore, it presents potential benefits for policymakers and governments by demonstrating how underutilized spaces or old buildings can be repurposed effectively, contributing to sustainable urban development.*

Originality of the paper. *The originality of these papers lies in the intersection of studies in social innovation through urban regeneration. They give new perspectives on projects that have not been seen before, focusing on specific characteristics and skills acquired over time. This brings new contributions to the literature on orchestrators, especially in the context of infrastructure, where they must deal with different challenges and stakeholders to develop the project.*

Keywords: *social innovation; urban regeneration; role of orchestratorsy*

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The New Longevity Economy: its Definition and its Ecosystem

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Everyone Desires Long Life, Not One Old Age
Jonathan Swift

Abstract

Il presente lavoro analizza la nuova economia della longevità quale ecosistema dell'innovazione. Se ne vuole proporre una prima definizione al fine di distinguerla dalla più conosciuta Silver Economy in quanto l'economia della longevità non si limita a rispondere ai bisogni immediati della popolazione anziana, ma promuove un approccio più ampio e sistemico al prolungamento della vita umana. Lo scenario contemporaneo di una popolazione più longeva richiede una serie di rivoluzioni per la nostra società. Il contributo, attraverso l'analisi di report, contributi scientifici e summits consente di mappare gli stakeholders di questo nuovo ecosistema, delineando e rappresentando le principali attività e obiettivi di ciascuno di essi. Il contributo offre prospettive per future ricerche e posiziona per la prima volta l'economia della longevità nel panorama scientifico del management, stabilendo un'importante base per studi futuri.

Framing of the research. *Lo scenario contemporaneo sta facendo i conti con una popolazione sempre più anziana. In Europa, gli anziani sono più di 90 milioni, tale "rivoluzione demografica" prevede che nel mondo nel 2025 si potranno contare 1,2 miliardi di anziani per arrivare ad un raddoppio nel 2050, come recentemente esposto in Scott (2023) il 50% dei bambini dei paesi sviluppati arriverà a toccare la soglia dei 90 anni (Scott, 2023).*

L'aumento della longevità è un traguardo importante che pone sfide e ristrutturazioni socio-economiche sostanziali, (Scott, 2021), ma oltre al traguardo di vivere una lunga vita cresce anche l'interesse sul come arrivare al finish line, in sostanza aumenta sempre di più il voler arrivare ad essere anziano godendo di una buona salute, riducendo così il cosiddetto gap tra life span ed health span. È in questo contesto che sta emergendo la cosiddetta economia della longevità, un settore in espansione, ma ancora poco definito nei suoi confini e nelle sue caratteristiche.

Le stime di Allied Market Research Group confermano il crescente interesse verso questo settore: il valore complessivo delle terapie per la longevità e l'anti-invecchiamento ha raggiunto 25,1 miliardi di dollari nel 2020 e si prevede che crescerà fino a 44,2 miliardi entro il 2030, per un tasso di crescita annuale composto (CAGR) del 6,1% (Allied Market Research, 2022). Tuttavia, nonostante questa crescita, la longevity economy si scontra con sfide strutturali significative. Secondo PricewaterhouseCoopers (2024) il settore è "frammentato e manca di una definizione univoca, generando incertezza nei mercati e negli investitori". Le barriere normative rappresentano un ulteriore ostacolo: "l'invecchiamento non è ufficialmente riconosciuto come una malattia, complicando i processi di approvazione di nuovi prodotti". A questo si aggiungono le sfide scientifiche, con "dibattiti ancora aperti sulle teorie dell'invecchiamento e prove limitate sull'efficacia di molte delle attuali soluzioni". Infine, la sostenibilità economica del settore resta incerta, a causa degli "elevati costi di sviluppo e dei lunghi tempi di commercializzazione", mentre la questione dell'accessibilità solleva interrogativi critici sulle "possibili disparità socioeconomiche nell'accesso alle terapie per la longevità" (PricewaterhouseCoopers, 2024). Queste sfide evidenziano la necessità di un'azione coordinata tra comunità scientifica, regolatori, investitori e policy makers per sbloccare il pieno potenziale dell'economia della longevità e garantirne uno sviluppo equo e sostenibile.

Il concetto di ecosistema è stato indagato da diverse prospettive il cui fulcro è la differenza in termini di attori, relazioni, valori e obiettivi, conoscenza, territorio e ubicazione, ad esempio Scaringella e Radziwon (2018) hanno identificato ecosistemi di business, innovazione, conoscenza e imprenditorialità, mentre Aarikka-Stenroos e Ritala (2017), concentrandosi su questioni legate agli attori, hanno aggiunto l'ecosistema delle piattaforme e quello dei servizi. Adner (2017) definisce l'ecosistema come "la struttura di allineamento dell'insieme multilaterale di partner che devono interagire affinché una proposta di valore focale si concretizzi". In esso, gli imprenditori possono competere e cooperare tra loro, ma il punto centrale di questo tipo di ecosistema non è l'imprenditore e il paesaggio che facilita la sua avventura imprenditoriale, bensì l'innovazione.

Le imprese modellano i loro processi di innovazione in funzione del proprio ruolo e della posizione occupata all'interno degli ecosistemi. Questi ultimi trascendono i confini di un singolo settore, offrendo un ambiente

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multidimensionale e complesso in cui le attività imprenditoriali si impegnano nella ricerca dell'innovazione (Klimas e Czakon, 2022). I diversi attori partecipano attivamente alla creazione, allo sviluppo e alla trasformazione delle strutture dell'ecosistema, ridefinendo costantemente i confini e la distribuzione delle risorse nei processi innovativi. In questo modo, essi si adattano alle evoluzioni dell'ecosistema, contribuendo alla sua crescita e trasformazione (Silva et al., 2024). Le soluzioni e i prodotti dell'economia della longevità operano in un ambiente in cui le università, i centri di ricerca, le grandi aziende farmaceutiche, i governi e gli investitori giocano un ruolo chiave nello sviluppo e nella commercializzazione delle innovazioni legate alla necessità trasversale di promuovere la longevità. Longevità non significa solo arrivare ad essere centenari, ma anche estendere l'aspettativa di vita, per questo l'attenzione è elevata in termini di terapie oncologiche e malattie rare.

Purpose of the paper. *Alla luce delle sfide poste, della crescente rilevanza di questa economia, il presente extended abstract mira a definire l'economia della longevità e mappare l'ecosistema che la sostanzia rispondendo alle seguenti domande di ricerca: cos'è l'economia della longevità? Chi e come compone l'ecosistema dell'economia della longevità?*

Methodology. *Si è adottato un approccio qualitativo adeguato a esplorare le domande di ricerca "cosa", "come", "quando", "chi" e "dove" (Gioia et al. 2013) particolarmente indicato quando la teoria non è disponibile, è scarsa o è nascente (Graebner et al. 2012). Si è così proceduto a mappare l'ecosistema dell'innovazione (Talwar et al., 2020) attraverso l'analisi del contenuto di report e articoli scientifici sull'economia della longevità (* in bibliografia) e un'analisi di casi specifici relativi a conference verticali sul tema della longevità. Sono stati analizzati i programmi, gli attori presenti e i contenuti di due eventi medici: Medical Longevity Summit, Longevity Med Summit; e di quattro eventi non medici, ossia il Global Longevity Summit, il Vatican Longevity Summit, in parte legato al Milan Longevity Summit, la Longevity Investor Conference. L'analisi dei dati è stata svolta seguendo l'approccio seguito da Wilson et al. (2022) e da Klimas and Czakon (2022) codificando i dati in maniera da individuare i vari tipi di attori (chi?), i ruoli distinti (cosa?), le diverse fasi (quando?) e il diverso impegno nei processi (come?). Per codificare e analizzare i dati, si è seguito il processo convenzionale della ricerca qualitativa che consiste nella riduzione dei dati, nella loro visualizzazione e nella loro verifica (Miles e Huberman 1994).*

Results. *L'analisi dei report di organizzazioni internazionali e delle pubblicazioni scientifiche presenti ha permesso di individuare una prima definizione di economia della longevità, esposta nella sezione successiva, mentre l'analisi di casi specifici ha consentito di mappare il nuovo ecosistema della longevità, delineato più avanti.*

Definizione dell'economia della Longevità

Volendo trovare una definizione esaustiva di longevity economy ci si scontra con il delineare i suoi confini di sviluppo. Secondo Fengler et al. (2024), la longevity economy si riferisce ai "contributi economici delle persone di età pari o superiore a 50 anni". Tuttavia, organizzazioni internazionali come il World Economic Forum (WEF) offrono una visione più ampia: "la longevity economy presenta un'opportunità unica per affrontare le sfide dell'invecchiamento sbloccando al contempo potenziale economico e sociale. Concentrandosi sull'invecchiamento, l'innovazione e la collaborazione, mira a garantire sicurezza finanziaria, migliorare la salute e rafforzare le connessioni sociali. Non si tratta solo di adattarsi ai cambiamenti, ma di creare sistemi che promuovano resilienza, equità e sostenibilità per tutti, sottolineando la necessità urgente di approcci strategici all'invecchiamento" (WEF, 2024) Il settore della longevità è particolarmente dinamico nelle aree in cui si intersecano più ambiti, come le piattaforme di salute digitale che uniscono il monitoraggio della salute a funzioni di connessione sociale, oppure i prodotti finanziari integrati con incentivi per il benessere. Tuttavia, l'economia della longevità rappresenta un fenomeno complesso che sfugge a una definizione semplice e deve essere distinta dal più tradizionale concetto di "Silver Economy". Mentre quest'ultima si concentra principalmente su prodotti e servizi che soddisfano i bisogni immediati e i modelli di consumo degli adulti più anziani (Colurcio et al.2022a), l'economia della longevità abbraccia un approccio più ampio e sistemico al prolungamento della vita umana, integrando elementi di edonismo e estetica.

Si vuole parlare di economia della longevità, e non semplicemente di "settore", perché il concetto va oltre la definizione tradizionale di un comparto economico specifico e circoscritto. L'economia della longevità non si riferisce a un'unica industria o a un mercato ben delimitato, ma afferisce ad un ecosistema ampio e interconnesso che comprende diversi settori, attori e dinamiche economiche, sociali e tecnologiche legate all'aumento della longevità dell'individuo. A differenza di un settore economico tradizionale, che può essere definito in base a specifici prodotti, servizi o catene del valore (ad esempio, il settore farmaceutico o quello assicurativo) e dall'interconnessione di diverse dimensioni quali ad esempio tecnologia, funzione d'uso e mercato-clienti, l'economia della longevità abbraccia una pluralità di ambiti, tra cui la sanità, l'innovazione tecnologica, la finanza, le politiche pubbliche e i servizi. Ai contestatori più arguti, che d'altra parte ci troverebbero in parte con loro concordi vista la vasta lettura sulla difficoltà di definire un settore, che utilizzassero il criterio della domanda per definire la longevità quale settore economico per ribadire la presente riflessione si potrebbe portare ad esempio la vicina Silver economy. Quest'ultima si tratta di un'economia la cui domanda proviene principalmente da una fascia di popolazione specifica, ma la varietà dei settori coinvolti (e delle domande) e l'impatto sistemico fanno sì che la Silver Economy sia più un'economia trasversale che un settore chiuso e delimitato e che si può al massimo condurre ma non mortificare al concetto di macro-settore (Colurcio et al., 2022b). Se fosse un settore, potremmo delimitare chiaramente quali aziende ne fanno parte. Ma la Silver Economy attraversa e modifica più settori, creando un effetto a catena su tutta l'economia (Colurcio et al., 2022b). Uguale concettualizzazione si estende all'economia della longevità, suo obiettivo non è limitarsi al soddisfacimento dei bisogni immediati di una popolazione che invecchia, ma si estende alla costruzione di un modello sostenibile di vita lunga e di qualità, che riguarda tanto gli

anziani di oggi quanto le generazioni future. Questo ecosistema coinvolge un'ampia rete di attori: aziende, istituzioni finanziarie, enti regolatori e organizzazioni sociali, tutti chiamati a contribuire a una trasformazione economica che va oltre il mero profitto. L'economia della longevità, infatti, non è solo un'opportunità di mercato, ma una necessità strategica per ripensare il nostro modo di vivere, lavorare e innovare in un mondo in cui la durata della vita continua ad aumentare.

Si può affermare che l'economia della longevità emerga come risposta e catalizzatore in una società che invecchia, sostenuta da due forze distinte ma interconnesse: da un lato, la spinta verso l'invecchiamento attivo da parte della società, e dall'altro, la ricerca edonica individuale di una decelerazione o addirittura di un'inversione del processo di invecchiamento. Questa ricerca di piacere e bellezza si riflette in un crescente interesse per stili di vita salutari, estetiche di giovinezza e esperienze che promuovono il benessere psicologico e fisico. Questa duplice natura, che concerne sia l'adattamento della società a una vita più lunga sia il desiderio personale di mantenere la giovinezza e il benessere, distingue nettamente l'economia della longevità dalla Silver Economy, che è più focalizzata sui servizi. Il Silver Economy Forum (2024) ha evidenziato come la transizione verso una longevità economica rappresenti un'opportunità promettente di crescita, da cui la società può trarre beneficio in termini di invecchiamento attivo e in salute, contribuendo a ridurre e ottimizzare la gestione di risorse scarse.

Pertanto, la definizione di economia della longevità adottata in questo documento, considerata la più completa al momento attuale, è quella fornita dalla Commissione Europea (2024), che definisce: "l'economia della longevità emerge come un concetto trasformativo. Riconosce non solo l'invecchiamento, ma un cambiamento significativo nella durata della vita, obbligandoci a sfruttare la flessibilità e le capacità dell'età. Questa nuova economia non si limita a vivere più a lungo: si tratta di garantire che questi anni prolungati siano più sani, produttivi e soddisfacenti. Essa trascende l'attenzione per i gruppi di età più avanzata e capitalizza il dividendo della longevità a tutte le età, riconoscendo il prezioso contributo sociale ed economico degli individui più anziani al di là delle loro esigenze sanitarie. rappresenta una sofisticata convergenza di molteplici settori che si occupano non solo delle esigenze dell'attuale invecchiamento della popolazione, ma dell'intero ciclo di vita del potenziamento e dell'estensione della longevità". Come recentemente classificato dal World Economic Forum (WEF), la nuova economia della longevità comprende un insieme di industrie interconnesse, tra cui: sanità e biotecnologie (inclusi diagnostica, medicina personalizzata e assistenza preventiva), servizi finanziari (pianificazione del pensionamento, gestione delle pensioni e prodotti di investimento specifici per l'età), assicurazioni (assistenza a lungo termine e coperture sanitarie specializzate), alloggi (strutture di vita assistita e adattamenti per anziani), tecnologia (sistemi di monitoraggio della salute e dispositivi di assistenza) e beni di consumo (prodotti progettati per le popolazioni anziane). La traiettoria di sviluppo di questo macro-settore suggerisce un futuro in cui le soluzioni per la longevità diventeranno sempre più personalizzate ed efficaci, supportate da intuizioni basate sui dati e dalla collaborazione intersettoriale. Questa evoluzione è accelerata da diversi fattori chiave, tra cui tecnologie di sequenziamento genetico sempre più accessibili, che offrono informazioni personalizzate sulla salute; banche dati multiomiche in espansione, che forniscono una comprensione più profonda dei processi di invecchiamento; applicazioni avanzate dell'intelligenza artificiale negli interventi legati all'età; un mercato in crescita per prodotti e servizi finanziari personalizzati adattati all'allungamento della vita; tecnologie emergenti che supportano la vita indipendente e la connessione sociale; e innovazioni nella progettazione del posto di lavoro e nello sviluppo delle competenze per una forza lavoro multigenerazionale. È evidente che stiamo parlando di un'area economica che include settori come la ricerca sul cancro, il diabete, la demenza, l'Alzheimer e altre patologie legate all'invecchiamento. Ma non si limita a questo; riguarda anche l'alimentazione, l'autonomia e il benessere complessivo delle persone, oltre ai servizi finanziari e previdenziali, ai dispositivi per il benessere e alla vita sociale e comunitaria. Stabilire con precisione quali imprese possano essere ricondotte all'economia della longevità risulta pertanto complesso, poiché essa si intreccia e converge con molteplici discipline e vari stakeholder.

Longevity Economy: il suo ecosistema di innovazione

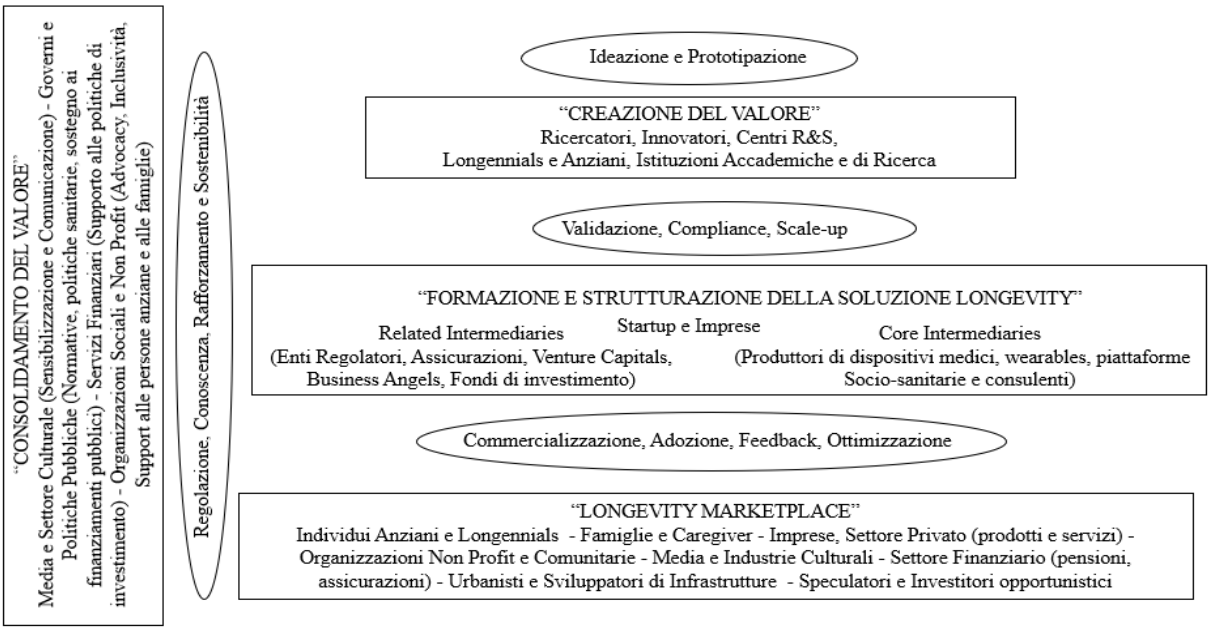
Analizzando i programmi, la struttura, i workshop, i relatori e le aziende partner presenti a questi eventi, è possibile delineare l'ecosistema dell'innovazione della longevità che risulta essere un sistema complesso e interconnesso sostenuto da una rete di collaborazioni tra settore pubblico, privato, organizzazioni non profit e comunità locali. Analizzando i programmi, la struttura, i workshop, i relatori e le aziende partner presenti a questi eventi, è possibile delineare gli attori principali. La mappatura qui proposta riflette il percorso delle soluzioni di longevità, dal concetto iniziale alla commercializzazione finale, utilizzando una struttura simile a quella utilizzata in Wilson et al. (2022) e permette di identificare: chi, cosa, quando e come, tabella 1. Dall'analisi degli eventi si conferma che l'ecosistema si sostiene sullo sviluppo di soluzioni innovative e integrate per affrontare sia le sfide dell'invecchiamento sia promuovere una vita più lunga e più sana. L'analisi degli eventi sulla longevità evidenzia non solo l'interconnessione tra progresso scientifico, dinamiche economiche e implicazioni sociali, ma anche alcune criticità legate alla loro natura altamente commerciale e orientata a un pubblico elitario. La maggior parte delle conferenze si svolge in luoghi esclusivi (Gstaad, Londra, Riyadh), con costi di partecipazione spesso elevati e un pubblico composto principalmente da investitori, fondatori di start-up e dirigenti aziendali. Ciò solleva interrogativi su chi beneficerà realmente delle nuove tecnologie anti-invecchiamento: si tratta di progressi per la popolazione generale o piuttosto di nuovi servizi e deformazioni del mercato del lusso. Il longevity global è composto da 878 membri, il 44% imprenditori, il 15% investitori, il 38% ricercatori", quindi gran parte degli attori sono imprenditori e ricercatori in cerca di validazione e sbocco al loro progetto di innovazione. Queste

ultime seguono un percorso che a partire dalla ricerca e dall'innovazione, passano attraverso la validazione e la strutturazione, per arrivare infine in pochissime al mercato. Il processo inizia con l'ideazione e la prototipazione, in cui il valore nasce grazie alla ricerca, all'innovazione e allo sviluppo di nuove soluzioni. In questa fase sono coinvolti ricercatori, innovatori, centri di ricerca e sviluppo, longennials e istituzioni accademiche. Questa attività porta alla creazione del valore, momento in cui si generano idee, tecnologie e modelli di business in risposta ai bisogni della longevità. Successivamente, il passaggio dalla teoria alla pratica richiede una fase di validazione, compliance e scale-up, in cui le idee vengono testate, adattate alle normative, il livello trasversale spiegato più avanti, e sviluppate su larga scala per poter raggiungere il mercato. A questo punto entra in gioco la formazione e strutturazione della soluzione longevity, che coinvolge startup e imprese. Gli attori principali in questa fase sono gli intermediari, suddivisi in due categorie: da un lato, gli enti regolatori, le assicurazioni, i fondi di investimento, i venture capital e i business angels, che forniscono supporto normativo ed economico; dall'altro, i produttori di dispositivi medici, i wearable, le piattaforme socio-sanitarie e i consulenti, che trasformano il concetto in un prodotto concreto; e le imprese e le startup del settore.

Una volta sviluppata, la soluzione viene commercializzata, adottata dal mercato e ottimizzata attraverso il feedback degli utenti e degli investitori. Qui si inserisce il longevity marketplace, l'ambiente in cui le soluzioni vengono offerte e utilizzate. Vi partecipano anziani, longennials, coloro che sono i destinatari specifici, famiglie, caregiver, imprese e in generale il settore privato con i suoi prodotti e servizi, i media e l'industria culturale, il settore finanziario con pensioni, investimenti e assicurazioni, urbanisti e sviluppatori di infrastrutture, oltre a speculatori e investitori, tabella 1 in appendice.

Si individua così come diversi attori siano presenti in maniera trasversale alle diverse fasi di sviluppo e funzionamento dell'ecosistema contribuendo al consolidamento del valore, abbiamo ad esempio i media e il settore culturale, che influenzano la percezione sociale della longevità; i governi, le istituzioni che con le politiche pubbliche stabiliscono regolamenti e finanziamenti che possono favorire o limitare la crescita del settore; il settore finanziario, che assicura il supporto economico attraverso strumenti del credito quali pensioni e investimenti, mentre le organizzazioni sociali e non profit offrono advocacy, supporto alle persone anziane e alle loro famiglie, favorendo un ambiente più inclusivo, equo e sostenibile. Questa struttura evidenzia l'interconnessione tra ricerca, innovazione, mercato e regolamentazione, mostrando come la longevity economy sia un ecosistema complesso che richiede la collaborazione di attori diversi per sviluppare soluzioni efficaci e sostenibili per l'invecchiamento attivo, figura 1. La codifica ha permesso di rilevare la presenza ricorrente di quattro principali categorie di attori: attori scientifici e clinici, prevalentemente attivi nella fase di ideazione, prototipazione e validazione (come ricercatori, medici, centri R&S); attori intermediari, tra cui regolatori, assicurazioni, venture capital e produttori di dispositivi, presenti soprattutto nelle fasi di scale-up e strutturazione della soluzione; attori finanziari e industriali, con un ruolo centrale nella fase di commercializzazione e ottimizzazione del valore; infine, attori di mercato e sistema, ovvero cittadini anziani, famiglie, imprese e policy maker, presenti nel marketplace e nelle fasi di consolidamento dell'impatto sociale ed economico.La distribuzione degli attori nei diversi eventi conferma una differenziazione funzionale tra summit di natura clinico-scientifica e summit orientati al business e alla policy. I primi, come il Medical Longevity Summit, si collocano prevalentemente nelle fasi intermedie del processo - validazione, compliance, strutturazione tecnica - con un forte focus sulla robustezza scientifica delle soluzioni e sulla regolamentazione medico-sanitaria. I secondi, come la Longevity Investor Conference o il Vatican Longevity Summit, presidiano le fasi terminali del processo - diffusione, commercializzazione, consolidamento - e coinvolgono attori con un orientamento finanziario, istituzionale o socioculturale. L'analisi comparativa rivela inoltre la presenza di pattern relazionali ricorrenti: in particolare, una crescente ibridazione dei ruoli, con attori tradizionalmente scientifici coinvolti in attività imprenditoriali e viceversa; l'emergere di coalizioni temporanee tra investitori, startup e policy maker per facilitare l'ingresso nel mercato di soluzioni validate; e l'attivazione di reti di lungo periodo tra istituzioni pubbliche, enti regolatori e comunità locali, finalizzate a consolidare l'accettabilità sociale delle innovazioni. In questo contesto, i longennials e i caregiver si configurano come figure-ponte tra la dimensione della creazione del valore e quella della sua adozione diffusa, svolgendo un ruolo attivo sia nella fase di co-design sia in quella di feedback e ottimizzazione. Nel complesso, il processo che emerge dall'analisi degli eventi si configura come un ecosistema dinamico e stratificato, nel quale gli attori non agiscono in sequenza lineare ma in modalità interattiva e spesso sovrapposta, con gradi diversi di impegno e di potere decisionale. L'approccio metodologico utilizzato ha consentito di ricostruire tali dinamiche, offrendo una lettura sistemica delle condizioni che facilitano o ostacolano l'innovazione longevity, e dei modelli organizzativi e relazionali che ne determinano il successo nei diversi stadi del ciclo di vita.

Fig. 1: Ecosistema della Longevità



Elaborazione degli autori

Research limitations. *Lo studio presenta alcune limitazioni che devono essere considerate nella valutazione dei risultati e delle implicazioni proposte. L'analisi si basa prevalentemente su dati secondari di eventi verticali sul tema, report e studi accademici. Questa impostazione, se da un lato consente una visione d'insieme e una sintesi delle conoscenze esistenti, dall'altro può limitare la capacità di cogliere dinamiche emergenti, percezioni degli attori coinvolti e variazioni contestuali che indagini più empiriche potrebbero cogliere. Inoltre, la natura concettuale dell'analisi, volta a strutturare e mappare l'ecosistema dell'economia della longevità, implica un certo grado di astrazione che potrebbe non tenere pienamente conto delle specificità operative e delle complessità pratiche che caratterizzano l'interazione tra gli attori del settore. L'assenza di validazione empirica diretta attraverso metodi quali interviste, survey o studi di caso rappresenta il principale limite, in quanto non permette di testare direttamente l'applicabilità e la concretezza del modello proposto nelle diverse realtà economiche e sociali. Per superare queste debolezze, ricerche future dovrebbero integrare approcci metodologici più articolati, combinando analisi qualitative o quantitative, coinvolgendo direttamente stakeholders chiave attraverso studi sul campo, e valutando l'effettiva implementazione delle soluzioni proposte nonché comprendere come evitare di generare e perpetrare disuguaglianze e inequità che già attualmente, in una società non progettata per la longevità, generano una riduzione della vita (Emanuel, 2021). Infine sarà importante interrogarsi su quanto la nuova economia della longevità sarà longeva e quali fattori possono contribuire a questo.*

Managerial implications. *Le implicazioni manageriali della longevity economy sono molteplici e richiedono una profonda revisione delle strategie di business, nonché un rinnovamento nell'innovazione dei prodotti e dei servizi e nelle modalità di interazione con un mercato in costante evoluzione. La sfida manageriale consiste nel saper integrare le innovazioni emergenti, tipiche della nicchia della longevity economy, nel regime consolidato, senza trascurare le dinamiche globali che ne guidano l'evoluzione. In tal senso, è necessario sviluppare strategie di integrazione e adattamento capaci di superare le barriere istituzionali e normative, promuovendo un dialogo costruttivo tra attori innovativi e strutture consolidate. I dirigenti devono creare strutture organizzative che facilitino la collaborazione tra scienziati e professionisti di business, sviluppando competenze interne per valutare innovazioni scientifiche complesse e tradurle in proposte di valore concrete per il mercato.*

Da un punto di vista strategico, le imprese devono ripensare i propri modelli di business per rispondere alle esigenze di una popolazione che invecchia, offrendo soluzioni personalizzate e integrate che uniscano salute, benessere e accessibilità. Tale approccio richiede un'attenzione particolare all'esperienza del cliente, considerando una clientela caratterizzata da bisogni, preferenze e capacità di spesa eterogenee. L'invecchiamento attivo, insieme alla crescente digitalizzazione, impone lo sviluppo di prodotti e servizi user-friendly, con interfacce intuitive e tecnologie assistive in grado di abbattere le barriere d'uso.

Sul fronte dell'innovazione e della ricerca e sviluppo, è indispensabile che le imprese investano in soluzioni volte a migliorare la qualità della vita, quali tecnologie per il monitoraggio della salute, telemedicina, dispositivi indossabili e piattaforme digitali per la prevenzione. In questo contesto, la collaborazione con istituzioni accademiche, startup e centri di ricerca si configura come un elemento cruciale per accelerare lo sviluppo e l'adozione di nuove tecnologie. In un settore in evoluzione come quello della longevity, i manager devono adottare un approccio di "regulatory foresight", anticipando cambiamenti normativi e contribuendo attivamente alla definizione di standard emergenti anziché subirli passivamente. I leader devono sviluppare competenze specifiche nella gestione di partnership complesse, implementando

sistemi di governance che bilancino autonomia e integrazione. La "coopetizione" diventa un modello prevalente che richiede nuovi approcci alla negoziazione e alla protezione della proprietà intellettuale. Inoltre i teams di R&S richiedono l'integrazione di competenze diverse (gerontologia, design, ingegneria, scienze comportamentali, scienze della vita), imponendo ai manager di creare ambienti collaborativi che favoriscano la cross-fertilizzazione. Diventa poi necessario integrare processi di validazione clinica/scientifica sin dalle prime fasi dello sviluppo prodotto, richiedendo competenze di regulatory intelligence e gestione dei rapporti con autorità scientifiche.

Dal punto di vista operativo, i manager devono affrontare le sfide legate alla scalabilità e alla sostenibilità economica delle soluzioni proposte. In particolare, la regolamentazione e i sistemi di rimborso sanitario assumono un ruolo centrale, rendendo essenziale una gestione efficace delle relazioni con enti regolatori e assicurazioni. Inoltre, l'adozione di modelli di business innovativi, come il pay-per-use, abbonamenti o modelli di finanziamento pubblico-privato, potranno influenzare significativamente la diffusione e la sostenibilità delle soluzioni dedicate alla longevità.

Infine, le imprese devono considerare anche l'impatto organizzativo e culturale delle trasformazioni in atto, ponendo particolare attenzione alla gestione delle risorse umane in un contesto intergenerazionale e all'adozione di politiche di inclusione e accessibilità rivolte sia ai clienti che ai dipendenti senior. I manager devono valutare attentamente il giusto equilibrio tra disruption digitale e approcci consolidati, considerando che nel mercato della longevity la fiducia e la reputazione giocano un ruolo cruciale. Le strategie di fusione e acquisizione possono rappresentare una via efficace per combinare innovazione tecnologica e credibilità di mercato. Parallelamente, la comunicazione e il branding devono evolversi per superare gli stereotipi legati all'invecchiamento, valorizzando il ruolo attivo degli anziani nella società e nell'economia e costruendo messaggi che enfatizzino benessere, empowerment e innovazione. Sarà poi fondamentale progettare esperienze cliente che considerino sia l'utilizzatore finale (anziano o longevo) sia altri stakeholder coinvolti nel processo decisionale (familiari, caregiver) e definire modelli di prezzo che garantiscano accessibilità economica pur mantenendo sostenibilità finanziaria, esplorando schemi di pagamento flessibili, modelli subscription e partnership con assicurazioni/sistemi sanitari. Le imprese e i cittadini devono cominciare a tenere in considerazione la ristrutturazione del percorso di vita di un individuo longevo che potrebbe avere nuovi tipi di bisogni o maturarne di tradizionali ma in fasi di vita differenti rispetto a quelle passate, ad esempio crisi di identità, necessità di formazione continua, nuove strutture del credito. La complessità dell'ecosistema della longevity economy richiede un approccio manageriale che integri diverse dimensioni trasversali a tutti i livelli operativi. La governance dell'innovazione etica emerge come elemento fondamentale, con la necessità di istituire comitati e processi decisionali che tutelino costantemente la dignità e l'autonomia dei consumatori, dalla fase di ideazione fino alla commercializzazione dei prodotti e servizi. La resilienza strategica si configura come capacità essenziale in un settore caratterizzato da rapidi cambiamenti demografici, tecnologici e normativi, richiedendo lo sviluppo di competenze organizzative orientate all'adattamento attraverso approcci di scenario planning e strategic foresight specificamente calibrati sulle dinamiche di lungo periodo che contraddistinguono la longevity economy. Questi elementi trasversali, integrati in una visione sistemica, costituiscono il fondamento per un approccio manageriale efficace in un contesto che richiede non solo competenze tecniche, ma anche una profonda comprensione delle dimensioni umane, etiche e sociali dell'invecchiamento. La complessità dell'ecosistema della longevity economy richiede un approccio manageriale che integri diverse dimensioni trasversali a tutti i livelli operativi. Questa integrazione diventa particolarmente critica quando si considera che le opportunità di mercato e di innovazione non dipendono solo dalla maturità tecnologica, ma da processi di allineamento sociali fondamentali per il successo in questo settore.

Originality of the paper. *Il presente studio espone la differenza tra Silver Economy e Longevity Economy evidenziando come la recente definizione proposta dalla Commissione Europea sia ad oggi la più adeguata a descrivere questa nuova dimensione. Inoltre, si tratta del primo studio a mappare gli stakeholders e il più ampio ecosistema dell'economia della longevità offrendo e aprendo nuove linee di ricerca sia a livello teorico sia manageriale.*

Key words: *Longevity Economy; Innovation Ecosystem; Innovation niche; Stakeholder mapping; Economic impact of aging; Silver economy; Business strategy*

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Appendice

Tabella 1. Classificazione attori - chi, i ruoli distinti -cosa, le diverse fasi -quando e il diverso impegno nei processi -come

Dati	Attori (Chi?)	Ruolo (Cosa?)	Fasi (Quando?)	Impegno nei Processi (Come?)
"*This event is meant for those in a position to significantly impact the longevity industry, whether as an entrepreneur, life sciences executive, investor, researcher, influencer, or government representative.*" "*Developing aging therapies requires both new science and new business models.*" - LGL	Ricercatori, Innovatori, Centri R&S, Istituzioni Accademiche	Creazione di conoscenza e innovazione	Ideazione, Prototipazione, Validazione	Ricerca, sviluppo tecnologico, test di soluzioni
	Startup e Imprese	Sviluppo e implementazione di soluzioni	Strutturazione, Scale-up, Commercializzazione	Innovazione, produzione, distribuzione di prodotti e servizi
"Scelte sane, vita più lunga: il potere della prevenzione Un'esperienza interattiva per scoprire l'impatto degli stili di vita sulla salute" Milan LS Lab	Longennials e Anziani	Beneficiari e co-creatori di soluzioni	Tutte le fasi (dalla creazione alla commercializzazione)	Feedback su prodotti/servizi, adozione e partecipazione attiva
Technogym Checkup: Scopri la tua Wellness Age - Milan LS	Core Intermediaries (Produttori di dispositivi, piattaforme socio-sanitarie, consulenti)	Infrastruttura tecnologica e servizi	Strutturazione, Scale-up	Fornitura di soluzioni tecniche e operative
"*Start-Up Showcase is an opportunity within the Longevity Investors Conference for Start-Ups to present themselves in front of a selected audience of investors*" - LI	Venture Capitals, Investitori (Business Angels, Fondi di investimento)	Sostegno finanziario e regolamentazione	Strutturazione,Scale-up, Commercializzazione	Investimenti, valutazione dei rischi, creazione di normative e incentivi
"Former Minister of Health, Welfare and Sport of The Netherlands will be speaker and panelist of the Panel Time to Act!" - LMed Summit	Governi e Istituzioni Pubbliche, Enti Regolatori, Assicurazioni	Regolamentazione e politiche di sostegno	Tutte le fasi	Creazione di normative, finanziamenti, supporto alla ricerca e allo sviluppo
"View the industry's freshest news and updates! Explore the latest breakthroughs and trends to keep up to date" - CCR Medical Summit	Settore Privato (aziende di servizi e prodotti per la longevità)	Fornitura di beni e servizi	Commercializzazione, Adozione, Ottimizzazione	Creazione e vendita di soluzioni per il mercato della longevità
"*Musei d'Arte e Attività Culturali: Effetti su Salute e Longevità. Scopri il potere dell'arte e della cultura nel migliorare il benessere psicofisico - Conferenza (al termine delle sessioni di laboratorio)"*	Media e Industrie Culturali	Sensibilizzazione e cambiamento della percezione sociale	Tutte le fasi	Creazione di contenuti, educazione, diffusione culturale
"*We work in partnership with several associations and medical societies*" - L Med Summit	Organizzazioni Non Profit e Comunitarie	Advocacy e supporto sociale	Tutte le fasi	Programmi di inclusione sociale, supporto alla popolazione anziana
Spazi di Lavoro e Benessere: Progettare per Vivere Meglio - Milan LS Lab	Urbanisti e Sviluppatori di Infrastrutture	Progettazione di ambienti accessibili	Strutturazione, Commercializzazione	Pianificazione urbanistica, costruzione di spazi inclusivi
"*The goal of building a society that values every stage of life and promotes intergenerational solidarity*" - Vatican LSummit	Caregiver e Famiglie, Cittadini	Supporto diretto agli anziani	Adozione, Ottimizzazione	Assistenza quotidiana, decisioni di consumo, influenza sulle scelte di mercato

Elaborazione degli autori

From Purpose to Impact: A Multi-Level Framework for Embedding Human-Centered Values in Service Ecosystems

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Abstract

In a world marked by systemic crises and shifting social expectations, purpose has emerged as a central organizing principle for businesses. Yet the translation of purpose into actionable strategies remains fragmented, especially across different levels of service ecosystems. This paper proposes a conceptual framework that integrates Needs Theory (NT), Humanistic Management (HM), and Transformative Service Research (TSR) to explore how purpose-driven strategies can be operationalized at the micro (individual), meso (organizational), and macro (societal) levels. Drawing on a narrative literature review and emerging case examples, the framework outlines how human-centered values such as autonomy, dignity, inclusion, and shared value can inform service design, organizational culture, and stakeholder governance. This paper contributes to ongoing debates around sustainable value creation and ethical management by offering a multi-theoretical and multi-level lens to guide future empirical work on purpose-driven service transformation.

Framing of the research. *The notion of "purpose" has gained increasing traction in management discourse, not merely as a motivational tool but as a strategic orientation that redefines the role of business in society (Henderson, 2020; Mayer, 2021; Cucino et al., 2023). As consumers, employees, and policymakers demand greater alignment with ethical, environmental, and social values, firms are under pressure to move beyond performative responsibility and toward meaningful, systemic impact. Purpose has been recognized as a critical factor in shaping the main agenda of both individuals and organizations in the 21st century (Besley & Ghatak, 2017; George et al., 2023). This shift reflects social transformations (Hollensbe et al., 2014) and the impact of global crises that have exposed the limitations and vulnerabilities of profit maximization as a dominant guiding principle. Individuals, particularly among younger generations, are seeking meaningful work that aligns with their personal values and contributes to a greater social good (Gartenberg et al., 2016; Rosso et al., 2010). Consumers value brands' ethical conduct, transparency, and alignment with social and environmental values. Social and environmental movements advocate for justice, equality, and well-being (Accenture, 2018).*

This shift has reshaped the expectations placed upon businesses and their role in society (Blocker et al., 2024). A purpose-driven transformation in business is meant as a "strategic approach that extends beyond profit to encompass societal impact and stakeholder value" (Carreno, 2024, p. 1). The UN Global Compact (2022), the world's largest corporate sustainability initiative, underscores the importance of integrating purpose into business strategy as a means to foster long-term resilience and sustainable value creation. The institutionalization of purpose-driven business principles has also gained traction through influential academic and policy frameworks, including initiatives such as B Corporation certification and the Conscious Capitalism movement (Marquis, 2020). Business leaders and institutions have increasingly endorsed a broader, stakeholder-oriented conception of corporate responsibility that encompasses employees, communities, and the environment (Brammer et al., 2012). Organizations that invest in human well-being and demonstrate commitment to fairness and inclusion tend to benefit from enhanced employee engagement, talent retention, and innovation (Bailey et al., 2017; George et al., 2021).

However, while the business case for purpose is well-acknowledged, its implementation remains ambiguous. How can organizations embed purpose in a way that moves beyond branding or leadership rhetoric? How can businesses activate systems and structures that place human well-being and dignity at the center of their design and delivery logic?

This paper addresses these questions by proposing a multi-level conceptual framework rooted in the integration of three complementary theoretical perspectives: Needs Theory, Humanistic Management, and Transformative Service

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Research. Together, they provide the foundation for a people-centered, purpose-aligned model of value creation in business and service ecosystems.

NT, particularly as articulated in Maslow's hierarchy of needs (Maslow, 1943) and Self-Determination Theory (Deci & Ryan, 2000), provides a psychological foundation for understanding fundamental human motivations (Cooke and Mills, 2008).

The study of human needs has evolved from rigid hierarchical models to dynamic, adaptive frameworks that recognize the uncertainty of human motivation. Traditional theories, such as Maslow's hierarchy, conceptualized needs in a sequential order, proposing that the self-actualization stage comes after once basic physiological and social needs are met. However, present research found that human needs are interdependent, context-sensitive, and influenced by several factors such as social, economic, and cultural (Suh, 2007). Purpose-driven individuals pass through these needs animatedly, seeking fulfillment not only for personal growth but also as a means of contributing to broader societal well-being. When workers, work communities, and organizations recognize this interplay of purpose and commitment throughout different ladders of the hierarchy of needs, they can create environments that support self-sufficiency, competence, and belongingness. ultimately fostering a sense of purpose and commitment. Purpose-driven service organizations use purpose oriented insights to provide work environments and service models that align individual fulfillment with collective progress (Hollensbe et al., 2014). By connecting needs theories with purpose based business practices, organizations can create shared values-driven models that do not simply pursue profit but also focus on ethical responsibility and human well-being. Hence, in purpose-driven service ecosystems, sustainability and human well-being become central goals for businesses that create environments that merely empower individuals, support communities, and drive meaningful societal transformation.

Unlike profit-driven models, Humanistic Management (HM) views individuals as ends in themselves, focusing on meaningful work and well-being (Melé, 2016; Dyck, 2020). This approach emphasizes dignity, ethics, and legitimacy (Pirson, 2020) by incorporating shared governance, ethical decision-making, and stakeholder inclusivity (Pirson & Turnbull, 2011). Despite HM being born with a strong individual-level emphasis within the business context, it has evolved to embed the multi-level nature of responsible managerial actions (Pirson, 2020; Laasch et al., 2020). Extending beyond organizations, HM contributes to ethical business cultures and societal well-being by integrating fairness, integrity, legitimization, company image, and reputation into the investigation (Pirson, 2015; Laszlo, 2019; Gomes et al., 2022; Shrivastava & Zsolnai, 2022). HM distinguishes people as naturally valuable, individually capable, and worthy of meaningful work that impacts both individual and societal well-being along with business progress. Service organizations that adopt a stakeholder-centered approach provide a friendly and healthy workspace and environment to the employees for their personal growth, work-life balance, and ethical leadership. By combining social and environmental responsibility into decision-making, HM helps in carrying out sustainable practices that associate financial success with societal well-being. This comprehensive and all-inclusive approach improves inter-organizational cooperation, urges ethical market behaviour, and directs purpose-driven innovation.

In this regard, Service Research has developed a stream of literature, i.e., Transformative Service Research (TSR), examining how some services might foster social change and individual and community well-being (Davis & Pechmann, 2013). At the core of TSR is well-being, conceptualized through both subjective and objective dimensions. While well-being reflects a state of thriving that characterizes the ongoing process of succeeding across various stages of work and life domains. Moving beyond efficiency and profitability, TSR focuses on value co-creation across different levels (Alexander et al., 2018). TSR emphasizes empowerment, accessibility, and inclusivity in service ecosystems (Andreassen et al., 2016) yet requires deeper exploration of systemic barriers and inequalities influencing service participation and outcomes (Galeone & Sebastiani, 2021). Studies have found that service-led well-being transformation requires collaborative and shared value creation within service ecosystems (Blocker & Barrios, 2015; Wieczerzycki et al., 2025). Scholars underlined that a purpose-driven approach supports the delivery of TSR principles at the service ecosystems level through stakeholder engagement, social impact, and sustainable service models (Berry et al., 2025; Dodds et al., 2022). It can assist service organizations in designing and implementing services that empower consumers and employees and create an ecosystem that enhances both individual and society flourishing.

Through bibliometric analysis, the study examines the evolution of research on these theories, investigating their co-occurrence and how purpose driven approaches interplay their core concepts at different levels.

Purpose of the paper. *This paper aims to assess how organizations embed purpose in a way that moves beyond branding or leadership rhetoric and how businesses activate systems and structures that place human well-being and dignity at the center of their design and delivery logic. In response to pressing environmental, social, and economic challenges, a growing body of literature is converging around the need for purpose-driven organizations (PDOs) that prioritize not only profitability but also societal and planetary well-being (Mayer, 2020; Henderson, 2021). This transformation represents a fundamental shift from the shareholder primacy model (Friedman, 1970) to an economics of purpose rooted in systemic innovation and inclusive value creation.*

Purpose-driven companies are characterized by their commitment to solving problems for people and the planet, not profiting from creating them (Mayer, 2020). Their mission is not merely aspirational but actionable and measurable through their governance, finance models, partnerships, and innovation strategies. These firms operationalize purpose through clear alignment across strategy, employee engagement, and stakeholder relationships, as emphasized by Henderson (2021) in her theory of architectural innovation.

According to Gionfriddo et al. (2024), purpose within PDOs is articulated along three integrated dimensions:

1. *Purpose: A socially-oriented reason for being that transcends profit, expressed in a company's mission and implemented across strategy and governance.*
2. *People: The centrality of individuals, inclusion, and the elimination of organizational inequalities, promoting a regenerative and human-centric organizational culture.*
3. *Impact: A commitment to measuring and maximizing positive social and environmental outcomes over time.*

These dimensions are not only theoretical but are reflected in the practices of exemplary Italian firms such as Aboca and Loccioni, where ownership structures, long-term visions, and ethical investment reinforce the integration of purpose at all organizational levels (Cucino et al., 2023; Gionfriddo et al., 2024).

Furthermore, Henderson (2021) emphasizes that a shared purpose enhances a firm's capacity for systemic or architectural innovation the reconfiguration of social and technical systems rather than incremental improvements. Purpose thus becomes a strategic enabler that allows organizations to break from dominant industry logic, reimagine value creation, and drive institutional change.

However, this shift is not without managerial challenges. The dynamics of PDOs require new competencies in vision alignment, relational governance, and inclusive leadership, capable of navigating complex trade-offs and creating trust-based ecosystems. Trust and shared purpose serve as invisible assets, enabling firms to form relational contracts, foster stakeholder alignment, and sustain innovation beyond market transactions (Henderson & Van den Steen, 2015). Purpose is not, therefore, a label but an organizing logic that, when embedded across operations, culture, and partnerships, can reorient firms toward the common good. Purpose-driven organizations, when authentically committed and structurally equipped, become powerful agents of regenerative innovation.

The emerging model of purpose-driven organizations reflects a significant shift in how businesses conceive value not just as economic output but as social, environmental, and human progress. What makes this transformation especially interesting is that it cannot be explained or operationalized by a single theory. Instead, it sits at the intersection of several complementary paradigms: Transformative Service Research (TSR), Needs Theory (NT), and Humanistic Management (HM). Here, TSR focuses on how service ecosystems can generate uplifting changes in individual and collective well-being. In a PDO context, this lens helps explain how services and business models can be intentionally designed to reduce inequality, increase access, and enhance life quality. Moreover, this lens underlines the importance of stakeholder inclusion, co-creation, and impact measurement in aligning purpose with delivery. TSR links directly with the "impact" dimension of PDOs making purpose tangible through outcomes that matter to people and the planet. NT (e.g., Maslow, Deci & Ryan's Self-Determination Theory) helps explain why purpose matters to employees, customers, and society. It gives a psychological foundation for purpose by emphasizing both the fulfillment of basic human needs, i.e., autonomy, competence, and relatedness, and the role of meaningful work in enabling personal flourishing and motivation. This aligns directly with the "people" pillar of PDOs recognizing that human-centered organizations are more resilient, innovative, and trusted. Finally, HM places human dignity, ethical reasoning, and stakeholder value at the center of managerial decision-making. It critiques the shareholder primacy model and calls for a governance model rooted in relational trust, justice, and moral legitimacy, and the integration of values into business strategy not just outcomes. This is deeply aligned with the "purpose" pillar of PDOs grounding mission and vision in ethical responsibility, not market positioning.

Methodology. *This paper adopted systematic literature reviews (SLRs) to investigate how NT, TSR, and HM collectively enhance the understanding of a purpose-driven approach and how their interaction better responds to a purpose-driven approach to shaping business management. The preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol suggested by Moher et al. (2009) was employed to identify studies indexed in Scopus to ensure transparency and robustness in the studies' selection process (Mongeon and Paul-Hus, 2016). Moreover, we used Boolean operators in our search string, such as "AND" and "OR" to establish a logical conjunction between the keywords, "humanistic management*" OR "humanistic*", AND "need theor*", AND "transformative service*" OR "service*", ensuring that only publications containing all these terms are retrieved within the domain of "title, abstract, and keywords" of the publications in the Business, Management, and Accounting domains. The asterisk (*) is used to account for variations in the keywords. Following the PRISMA approach, the final pool of selected articles was further analyzed using bibliometric descriptive and co-occurrence analyses.*

The initial search based on distinct search strings gave a limited number of articles, only 35. The final sample data were organized into two Microsoft Excel files (.csv) for descriptive analysis using Bibliometrix (Siemieniako et al., 2021) on Biblioshiny using RStudio (version 2024.12.1+563) and co-occurrence analysis (Mariani et al., 2023) using VOSviewer (version 1.6.20) software (Van Eck & Waltman, 2010). The descriptive analysis examined publication trends, prolific authors, highly cited works, influential countries, visualizations of WordCloud and TreeMap, and key topics, main anchored word, and their interconnections, with linkage strength determined by keyword associations (Nalbant & Aydin, 2025).

Results. *The bibliometric and thematic content analysis reveals a growing and diversifying scholarly interest in the intersection between Needs Theory (NT), Humanistic Management (HM), and Transformative Service Research (TSR) as foundational pillars in the study and practice of purpose-driven organizations (PDOs). Our results offer key insights across three analytical levels: (1) publication and citation trends, (2) keyword mapping through word cloud, TreeMap, and co-occurrence clusters, and (3) thematic clusters derived through content analysis.*

The publication trend over the last 54 years (from 1971 to 2025) indicates that studies on investigated sets of keywords were first published in 1971 (Gross, 1971). Over time, the number of publications has notably increased since 2019 with 23 articles in the last seven years (2019 to 2025). Furthermore, studies have been dispersed across various journals. The Humanistic Management Journal has emerged as the leading journal. Geographically, the most productive countries include China, the USA, and the UK, while the USA leads in total citations, suggesting higher international impact and reach. These patterns reflect both a global diffusion of interest in purpose-driven research and the heterogeneity of its disciplinary applications, from public policy to marketing and organizational behavior.

The most frequent keywords in the literature such as human, job satisfaction, healthcare quality, social welfare, and service industries confirm the centrality of well-being-oriented service logic in the purpose-driven business paradigm. Key terms tied to NT (e.g., Maslow's hierarchy of needs, self-care, awareness), HM (e.g., ethics, collaboration), and TSR (e.g., co-creation, service encounter) reinforce the relevance of these theoretical domains in shaping organizational purpose.

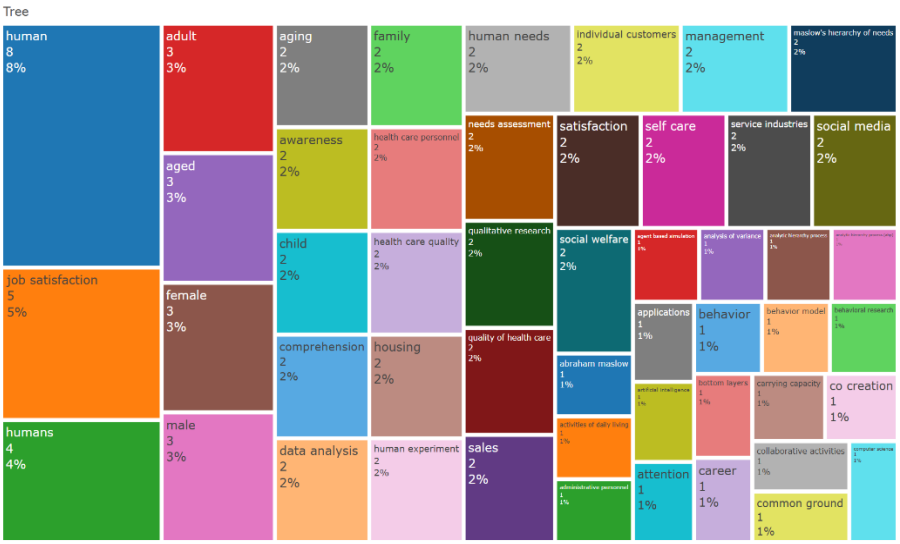
Similarly, words like self-care, co-creation, and awareness explain the role of the service ecosystem in inspiring people at individual and community levels. Interestingly, the emergence of terms like female, male, and human experiment hints at increased sensitivity to ethical considerations, demographic inclusivity, and diversity critical aspects of both TSR and HM frameworks.

Fig. 1: Wordcloud

Source: Authors' own work

The TreeMap of bigrams from research titles further confirms the relevance of recurring concepts such as human, job satisfaction, healthcare quality, family, and aging. These reflect the multi-level engagement of PDOs, from individual well-being to systemic design, aligning closely with TSR's emphasis on uplifting changes in service ecosystems. Simultaneously, references to Maslow's hierarchy of needs and human needs connect to NT's psychological framing of purpose, while the presence of awareness and self-care points to internalized drivers of pro-social behavior.

Fig. 2: TreeMap



Source: Authors' own work

To translate the foundational insights from NT, HM, and TSR into actionable strategies, we propose a multi-level framework that conceptualizes how human-centered values such as dignity, autonomy, inclusion, and shared well-being can be embedded across three interconnected levels of service ecosystems: micro, meso, and macro.

At the micro level, purpose is expressed through the satisfaction of core human needs (Deci & Ryan, 2000), such as autonomy, competence, and relatedness. This level focuses on meaningful work and psychological safety, employee empowerment and well-being, customer co-creation experiences, and recognition of individual dignity in service encounters. Here, NT provides the foundation, showing how human needs and motivations can be fulfilled within service interactions, leading to deeper personal engagement and trust.

At the organizational (meso) level, the framework emphasizes governance structures, leadership behaviors, and culture-building that align operations with values. Key mechanisms include ethical and participatory leadership, purpose-aligned strategy and measurement systems, relational governance and stakeholder integration, internal social innovation, and learning environments. Humanistic Management becomes essential here, embedding human dignity and moral responsibility in decision-making processes, work design, and institutional identity.

At the macro level, service ecosystems are shaped by collaborative, cross-sectoral engagement aimed at addressing systemic challenges. PDOs act as agents of regenerative change by engaging in cross-sector partnerships for sustainability, but also promoting inclusive governance and civic participation, supporting policy advocacy and community building, and generating positive externalities (e.g., well-being, resilience, equity) This layer is deeply informed by TSR, which focuses on how service design and delivery can transform communities and foster systemic well-being.

Research limitations. *The study lacks empirical evidence and validation as it is theoretical and bibliometric. Future studies should consider this framework of TSR, HM, and NT for an empirical-based model. The keywords and databases are not all-inclusive. This study relied on a predetermined set of keywords and only one database, Scopus, which may limit the exclusivity of these key constructs. Future studies can include more keywords to provide more generalized outcomes and use other prominent databases while searching for relevant literature. These databases may include indexed and non-indexed databases to add well-published contributions along with grey literature. Also, the analysis is primarily limited and focused on titles and abstracts which may not provide full depth of conceptual relationships of key constructs, i.e., TSR, HM, and NT. Future studies can overcome this limitation by considering keywords-based conceptual associations to provide more in-depth literature insights.*

Managerial implications. *The proposed multi-level framework offers concrete guidance for managers, leaders, and policy-makers seeking to embed human-centered values into the core logic of their organizations and service ecosystems. It serves a dual function: both as a diagnostic tool and as a design heuristic. Managers can use the framework to map how purpose and human-centered values are currently distributed across the organization and its environment. Beyond diagnosis, the framework acts as a strategic design guide to help managers develop aligned interventions across the organization. Purpose, when operationalized at all three levels, becomes more than a mission statement it becomes a guiding logic for strategic decisions, employee relations, innovation, and stakeholder engagement.*

Originality of the paper. *This study explores how literature addresses organizations embedding purpose driven actions that move beyond branding or leadership rhetoric and how businesses activate systems and structures that place human well-being and dignity at the center of their design and delivery logic. The value of the resulting framework lies in its recognition that purpose is both a design and alignment challenge. Indeed, micro-level flourishing is unsustainable without meso-level support, but at the same time, meso-level culture cannot thrive without macro-level enabling conditions. Purpose-driven organizations, therefore, must strategically align values and practices across all three levels, ensuring coherence between individual experience, organizational integrity, and ecosystemic impact.*

Keywords: *Transformative Service Research, Humanistic Management, Need Theory, Purpose-driven business, Shared-value*

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Changing for Good: Conceptualizing life-affirming organizations

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Abstract

Life-affirming heterodoxy encompasses approaches that call for a shift away from the extractivist economy and the pursuit of exponential growth, characteristic of neoliberal capitalism. Instead, it advocates for a new economic orthodoxy grounded in principles that prioritize life and safeguard the integrity of socio-ecological systems. These principles require a fundamental redefinition of business purpose and management practices. This article conceptualizes life-affirming organizations (LAOs) as values-based and purpose-driven entities that help catalyze this transformative shift in both the economy and society toward the creation of life-affirming systems. For this purpose, we adopt a multiparadigmatic approach to review and integrate two heterodox approaches in business management and development - Humanistic Management and Regenerative Development. Though rooted in different disciplines and offering different perspectives, both share a commitment to advancing the common good. Using bibliometric literature reviews and qualitative thematic analysis, we develop a framework for LAOs by synthesizing the humanistic "inside-out" perspective with the regenerative "outside-in" lens guided by life-affirming principles. The former, grounded in dignity, extends human agency from individuals to organizations and systems. In contrast, the latter views organizations as embedded within complex socio-ecological systems shaped by more-than-human agency. By integrating anthropocentric and ecocentric foundations, LAOs interweave living beings, organizational structures, and ecological systems to chart pathways for transformative, purpose- and values-driven change. This concept yields theoretical and practical contributions, offering guidelines to support human-nature synergy and the thriving of all life within businesses and human organizations.

Framing of the research. *The current crises of the Anthropocene are disrupting the multiscale interactions among humans, their social structures, and the natural world (Bebbington et al., 2019; Sanford, 2019). These crises highlight the need for a comprehensive and holistic shift away from the still dominant neoliberal paradigm focused on growth and profit. Progress toward a clear and compelling alternative for systemic change requires interdisciplinary research (Haider et al., 2018), offering a critical stance on the dominance of anthropocentrism to reshape the interactions among nature, space, and society based on new foundational premises (Collard et al., 2018). Over the years, different conceptual and theoretical proposals have been advanced in an attempt to catalyze the shift, frequently being positioned within the "diverse economies" frame (Gibson-Graham, 2008). This work is also placed within this search for the ways in which humans can organize business and other activities to achieve the change in practice and shift the relationships between human enterprises and the natural world (Heikkurinen et al., 2016; Lovins, 2015).*

Recently, Waddock (2022, p.275) has systematized previous contributions into the concept of "life-affirming heterodoxy," new economic models that prioritize life and the integrity of socio-ecological systems. These models emphasize the interdependence and mutual well-being of people, nature, and complex living systems, while also bridging the long-standing divide between anthropocentric and ecocentric perspectives that has hindered the development of a "viable alternative" to mainstream economics (Harnesk & Isgren, 2022, p. 1678). Waddock (2022) envisions this alternative paradigm as a "new life-affirming economic orthodoxy" (p.275) that integrates various strands of economic heterodoxy into a cohesive framework. This integration is grounded on principles and values originating from a multidisciplinary literature that give life to both human and natural systems and sustain their evolution (Waddock & Kuenkel, 2019). The principle of "Relationality and connectedness" focuses on the multiple interactions between living beings and the environment. "Stewardship of the whole" addresses the multiscale maintenance of human and natural health in the system. "Cosmopolitan-localist governance" emphasizes novel forms of participatory governance rooted in a local context but linked to global systems. "Co-creation of the collective value" prioritizes dignity and well-being, promoting the societal common good over profit. "Regenerativity, reciprocity, and circularity" describes resource circularity within natural regenerative capacities that are supported through mutually beneficial relationships among beings. Finally, "equitable markets and trade" that develops as an outcome of the interaction between the previous five principles, secures market access and sufficiency of local producers through honest trade practices.

These foundational principles provide a broad basis for establishing a new economic orthodoxy replacing the dominant neoliberal paradigm. They also open pathways for identifying business and management theories aligned with economic heterodoxies - ones that redefine business purpose by shifting toward relational value, ecological regeneration,

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and social equity - enabling the translation of this vision into more localized and managerial applications. Humanistic Management (HM) and Regenerative Development (RD) are heterodox approaches in business management and development that have recently emerged from multidisciplinary research fields and practices aimed at moving beyond growth-and-profit-centered managerial models to drive systemic transformation in the economy and society. HM draws from studies in responsible management, entrepreneurship, cooperative capitalism, and business ethics. It is based on the intrinsic dignity and ethical value of human beings and aims to humanize businesses and society (Pirson & Lawrence, 2010). In contrast, RD originates from environmental and systems thinking. It seeks to align human activities with ecological processes and to generate net positive outcomes for planetary health (Bellato et al., 2022; Reed, 2007).

Purpose of the paper. *Informed by Waddock's call (2022) for "new life-affirming economic orthodoxy" (p.275) that integrates various strands of economic heterodoxy into a cohesive framework, this paper aims to conceptualize Life-affirming organizations (LAOs) as catalysts for transformative change in economies and societies toward the creation of life-affirming systems. The purpose is to envision the form of human organizations that could apply life-affirming principles in practice and through this contribute to the search for alternative business models for reshaping economies towards a new economic orthodoxy. HM and RD are the heterodox approaches to business management and development selected to ground this concept. Rooted in different disciplines offering distinct perspectives on change, both approaches share a commitment to advancing the common good grounded in values-based foundations. The leading research questions are: What makes an organization life-affirming? How can the foundations of HM and RD be integrated into the framework that defines LAOs?*

Methodology. *This paper adopts a multiparadigmatic approach (Gioia & Pitre, 1990) to review and integrate heterodox approaches in business management and development with the aim of conceptualizing LAOs. This approach is chosen as it facilitates the generation of more holistic insights by bridging diverse worldviews and exploring complex phenomena beyond the limitations of a single paradigm (Gioia & Pitre, 1990). The diverse disciplinary foundations underlying HM and RD provide the integrative insights needed for driving transformative change toward the creation of life-affirming systems. The research design includes Systematic Literature Reviews (SLRs) conducted with the PRISMA method (Moher et al., 2009) and bibliometric and thematic content analyses (Abbott & Monsen, 1979; Caputo et al., 2021). Results were systematized through the lens of Waddock's (2022) life-affirming principles in an integrated framework that defines LAOs.*

SLRs (Donthu et al., 2021) were performed with the strings "humanistic management" and "regenerative development" in Scopus and Web of Science databases in areas of economics, organizational, management, and business studies published in English until December 2023. For HM, 372 articles were screened, then narrowed to 80 after several rounds of filtering, with 13 added through snowballing, for a total of 93. For RD, 410 articles were screened, arriving at 85 and adding 11 through snowballing to reach a final sample of 96 articles. SLR was chosen as a method to select the literature as it is effective for a manageable sample size, allowing us to precisely identify relevant literature within our research domains while excluding publications from unrelated fields. In this case, SLRs followed PRISMA protocol for literature selection (Moher et al., 2009).

The final samples were examined through co-occurrence analyses (Caputo et al., 2021) and thematic content analysis (Abbott & Monsen, 1979). The co-occurrence analysis, conducted with VOSviewer (1.6.20), was used as it enables the identification of key concepts in samples and measurement of the strength of interconnectedness among them (Caputo et al., 2021) based on keyword frequency and linkages. The default minimum occurrence setting was adjusted from five to two to capture a broader conceptual network (van Eck & Waltman, 2010). In the HM sample, 35 keywords were grouped into four clusters, while in the RD, 48 keywords formed five clusters. Thematic content analysis of the samples was performed with Atlas.ti software (version 9), a widely used software in qualitative research (Zhang & Wildemuth, 2009). Following four rounds of coding and reduction, the HM sample yielded 176 codes grouped into 8 categories. The RD sample produced 148 codes and the same number of categories. In both samples, these categories were synthesized into four macro-level themes. The process involved iterative refinement and deeper exploration of relationships among codes, categories, and themes.

Waddock's (2022) broadly defined life-affirming principles, combined with a reflexivity approach (Alvesson et al., 2008) that examines how knowledge is produced within the literature and its broader social context, informed the systematization of the results of the co-occurrence and thematic content analysis. Reflexivity also enabled us to connect conceptual insights and practical implications, leading to the identification of actionable guidelines for developing life-affirming organizations. The outcome of this final step was the creation of a framework for LAOs, conceptualized as open human organizations that can foster human-nature synergy and secure the flourishing of all living beings, encompassing responsible, financially viable economic activities rooted in local contexts.

Results.

Core theoretical foundations and themes in HM and RD streams

The study identified the key theoretical foundations of HM and RD, which were reflected in co-occurrence clusters and across macro themes of thematic analysis encompassing meso-level categories (code groups) and micro-level codes.

In the HM stream, three core themes emerged prominently, focused on dignity, business ethics, and leadership, alongside managerial practices on individual, organizational, and societal levels informed by these principles. Dignity is understood as a universal attribute granted to all individuals within (and beyond) an organization, supporting value-creation (Pirson, 2017), collaborative governance (Pirson & Turnbull, 2011), and inclusive decision-making (Bachmann et al., 2018). Dignity is closely linked to the care for others and mutuality in the business environment, fostering

interpersonal relationships, social value creation, and environmental stewardship (Dierksmeier, 2016). Business ethics extends dignity in business practices, affecting corporate governance, innovation, and the relationships between the organization and society. Ethically-driven organizations promote employee trust (Spitzeck, 2011), diversity (Melé, 2016), and workplace freedom (Dierksmeier, 2016), while advancing the common good (Dyck, 2020), aligning internal values with social needs (Laszlo, 2019), and collaborating with other organizations for collective progress (Pirson & Lawrence, 2010). Leadership is a crucial element in shaping firms' cultures that prioritize dignity, well-being, and morality over efficiency and profits (Dillon, 2021). Leaders grounded in humanistic values help safeguard human rights and the cultural identity of the organization (Melé, 2003). They also promote participatory governance, collaborative actions, and power decentralization (Pirson & Turnbull, 2011) to support viewing organizations as communities of people (Melé, 2003).

In RD, themes reflect the multidisciplinary and systemic nature of this stream. We identify three themes addressing essential characteristics of the RD paradigm, along with the content exploring the need for the regenerative mindset in the current world. Holistic transformation is at the core of regenerative actions guided by living systems thinking (Bellato et al., 2022; Du Plessis & Brandon, 2015), which observes organizations and environments as dynamic, interdependent, and constantly evolving. This theme emphasizes the interconnectedness between humans, other living beings, and nature in co-evolving, bioregional socio-ecological systems (Bellato et al., 2023; Mehmood et al., 2020). It promotes a shift from fragmented to integrated worldviews, recognizing place-based development as essential to shaping regenerative actions (Benne & Mang, 2016). Collective co-creation emerges as a key mechanism for translating systems thinking into actionable, localized strategies that foster productive relationships among organizations, people, and the environment. All stakeholders are seen as co-creators (Spiller et al., 2010), contributing to systemic health, and supporting the exchange of energy, capital, and resources. These exchanges are supported by participatory governance structures that embrace pluriversal forms of knowledge, and local-specific practices, and ensure inclusivity in decision-making processes. These prominent themes converge in the idea of anthropo-bio harmonization, which underscores the need for synergy between human organizations and nature to promote collective well-being and ecological health. It highlights multiscale relationships that respect ecosystem boundaries and advocate for adaptive human behavior. This perspective also calls for a reconnection with nature - emotionally, cognitively, and spiritually - helping organizations align with the complexity of the natural systems in which they operate (Du Plessis & Brandon, 2015).

Framework for LAOs

Our proposed framework conceptualizing LAOs systematizes and integrates the multidisciplinary literature on HM and RD into four concentric circles (Figure 1). At its center lies a more-than-human ethos, which grounds and sustains the six core principles of LAOs (second circle). The outer circles translate these principles into thematic areas of action and practical guidelines that can inform place-specific interventions (third and fourth circles). These are derived from thematic and co-occurrence analyses, by reflexively examining the findings to construct actionable narratives that can be translated into context-specific actions. Further reflexive analysis was performed through the lenses of life-affirming principles, interlinking them with the content from the analyses. The framework's components are interconnected and mutually influential, ensuring holistic impact and functionality across scales, also correcting fragmented structures frequently present in classic and top-down enterprise models.

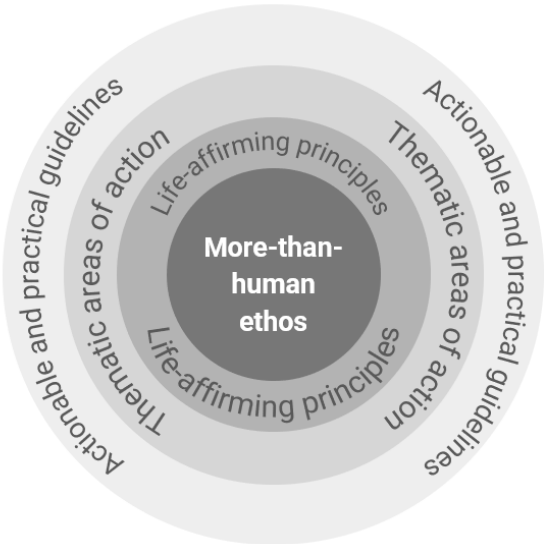
Grounded in a more-than-human ethos (Gherardi & Laasch, 2021), the framework highlights the complexity, interdependence, and uniqueness of LAOs (Bellato et al., 2022b; Caniglia, 2019), along with the need for bioregional adaptive responses to achieve systemic harmony (Bellato et al., 2023; Mang & Reed, 2012). LAOs are understood as communities of people embedded within and responsible for the health of broader biosystems. The core principles of LAOs recognize the intrinsic value of all life forms and actively foster co-existence between humans and nature, serving as stewards of ecological and social regeneration.

The relational nature of life-affirming organizations emerges through the connections they foster - both internally, among departments and teams, and externally, with broader society - reflecting the principle of "relationality and connectedness." These multi-scale relationships support organizational cohesion and social inclusivity, contributing to a more equitable economy. By applying living systems thinking, organizations gain insight into the dynamics of their surrounding environments and enhance bioregional harmony through stewardship and active engagement in local networks. The principle of "stewardship of the whole" is rooted in a regenerative mindset centered on care, responsibility, and holistic well-being. Life-affirming organizations act as pillars of healthy societies by promoting socio-ecological justice and facilitating interactions within the organization and the society to support system-wide thriving. "Cosmopolitan-localist governance" is grounded in essential human dignity and ethical behavior, shaping inclusive, participatory decision-making structures. Leadership in life-affirming organizations protects the value of each individual and ensures that diverse voices contribute to shaping organizational direction. Collaborative governance forms shape networks within and beyond an organization to secure the creation of the integral common good that benefits all employees and stakeholders. The principle of "co-creation of collective value" is expressed through participatory cultures that empower all members of the organization to contribute to shared goals. Life-affirming organizations function as communities where people interact meaningfully, fostering transformative learning, social innovation, and a shift from individualistic goals to communal well-being. Their activities align with human motivations while maintaining socio-ecological responsibility. "Regenerativity, reciprocity, and circularity" are supported by ethical, relational, and regenerative practices that sustain mutually beneficial relationships within and beyond the organization. This principle reinforces human-nature synergy, promoting net positive impacts that restore ecosystems and respect natural boundaries. Life-affirming organizations give back to nature through place-based, context-specific actions that regenerate socio-

ecological systems and support circular flows of resources, energy, and capital. Finally, the principle of "equitable markets and trade" reflects a shift in how economic activities are designed and carried out. They act in service of the systemic intercations among the previous five principles, supporting the life-affirming perspective instead of advancing economic reasoning as the sole purpose of organizations' actions. Life-affirming organizations prioritize ethical exchanges, stakeholder well-being, and humanistic values over profit maximization and perpetual growth. By adopting ecological worldviews and codes of ethics, they contribute to stable, sustainable economies that protect the environment and promote the flourishing of all life.

Actionable guidelines facilitate the application of each principle in practice and their translation into context-specific actions. To establish interconnectedness, organizations need to secure interactions among individuals, between individuals and organizations, and between organizations with other entities. It is achievable by identifying and understanding the dynamics of these relationships and by changing the purpose of the relationships to include diverse social groups that co-exist in the organization's environment. Stewardship is established through nurturing practices that maintain and improve human and non-human health both inside and beyond the organization. The successful stewarding role of one organization is achievable by understanding and using the patterns of exchange of resources, energy, and capital among actors to improve the health of the whole organization and system. Governance is built by creating space for employees' and stakeholders' participation in relevant decision-making processes that can be achieved through horizontal structures where power is distributed and divided. It also asks for context-specific monitoring tools to assess the impact of an organization's actions on both human and non-human systems. Identification of the collective goals that can be beneficial both for the organization and those involved, and actions that lead to their achievement, helps in securing the co-creation of collective outcomes. These goals do not necessarily have an economic value but are linked to the improvement of the well-being of those involved beyond the financial conditions. Organizations need to understand the functioning of the socio-ecological metabolism to which they belong and support the circularity of resources for securing their regeneration. It requires giving back to nature and improving its health to achieve reciprocity in their relationships. Lastly, to ensure equitable markets and trade, organizations need to create services or products that adapt to natural boundaries and respect the social, ecological, economic, and other limitations of the environment. These activities need to secure the organization's responsibility toward its environment and financial flows that can guarantee social responsibility toward its employees and broader society.

Fig. 1: Conceptual framework for life-affirming organizations Source: Authors



Research limitations. *LAOs are conceptualized on HM and RD, two heterodox approaches to business management and development selected as the foundation for this framework. As the research focuses on these two approaches, the contributions to the framework are currently limited to their perspectives. However, the framework could be expanded to incorporate other heterodox approaches that address more-than-human well-being and human organizations. Further research is needed to implement the framework in real-world settings and evaluate the ways in which its principles and guidelines translate into context-specific actions. Such practical applications offer insights into the framework's potential to support transformative processes and foster life-affirming organizations and systems. Field-based implementation could also generate practitioner-driven evidence to refine and strengthen the framework's content.*

Managerial implications. *This conceptual paper integrates diverse strands of heterodoxy in business management and development into a cohesive framework for creating values-based, purpose-driven organizations. These organizations aim to support both human and non-human well-being while maintaining sustainable financial practices. The paper provides a strong theoretical foundation along with actionable guidelines for applying life-affirming principles in practice, enabling the development of organizations and systems whose core purpose is to sustain all forms of life. By challenging the predominantly anthropocentric approaches to organizational and managerial theories (Kortetmäki,*

Heikkinen & Jokinen, 2022), LAOs promote organizational democracy, shared decision-making, and management free from power abuse (Garriga & Melé, 2004). Rather than prescribing fixed pathways, the framework offers adaptable guidance for context-specific actions, allowing for flexibility across diverse places and management settings. It encourages grounding organizational design, leadership, and decision-making in a more-than-human ethos and principles valuing life and socio-ecological systems. Managerial implications exhibit the potential of including more-than-human ethics and stewardship of the whole socio-ecological system as key components of internal organization for strengthening relationships among organizations' members and with organizations' enviornment, inclusive stakeholder management for collective contribution, and innovative ways for assessing the impact of organizations' activities for the creation of the common good beyond individual or purely financial gains. Managers inspired by these principles act as transformative leaders, guiding the organizations toward a purpose centered on the flourishing of all life. LAOs can serve as prototypes for responsible, values-based, and purpose-driven organizations capable of fostering systemic change from the ground up.

Originality of the paper. *The integration of heterodox approaches in business management and development into a cohesive framework remains largely unexplored. This paper takes the first step in bridging two approaches - HM and RD - by synthesizing the humanistic "inside-out" perspective with the regenerative "outside-in" lens. This integration aims to catalyze the emergence of life-affirming organizations that act for the good of all forms of life. The outcome of this work contributes to the ongoing research within the "diverse economies" frame (Gibson-Graham, 2008), and especially around the analyses of economic heterodoxies for the creation of "a new life-affirming orthodoxy" (Waddock, 2022, p.275). The article responds to Waddock's call to interconnect diverse heterodox approaches into a comprehensive whole and overcome theoretical boundaries in constructing a new orthodoxy that could respond to "grand challenges" of the Anthropocene (Waddock & Kuenkel, 2019). Multiparadigmatic approach allowed to bridge diverse theoretical constructions, to ensure an implementation of a systemic perspective within LAOs that can ensure comprehensive value creation within one organization and in its environment. It supports more-than-human well-being to extend the positive impact of the organization's actions and goes beyond financial rationale to focus on non-economic results of its activities. HM brings dignity, ethics, and legitimacy into business management and development, while RD extends systems thinking and the principle of anthropo-bio harmonization from socio-ecological systems to organizations. The conceptualization of LAOs is novel and marks the first attempt to scale the discourse on life-affirming heterodoxy to the levels of business management and place development. This scaling down is essential to operationalizing economic heterodoxies within real-world managerial practices, as businesses and institutions are key agents in shaping socio-ecological systems.*

Key words: *life-affirming heterodoxy; multiparadigmatic lens; humanistic management; regenerative development; life-affirming organization; purpose-and-values driven*

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Generativity, responsible innovation and biodiversity: the contribution of business to the common good

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Abstract

The multiple and severe crises of our time are deeply rooted in an economic model driven by relentless growth and profit maximization. This model has not only accelerated environmental degradation and resource depletion but has also exacerbated social inequalities and weakened collective well-being. These consequences have been intensified by cultural shifts that prioritize individualism, consumerism, and immediate gratification, often at the expense of long-term prosperity. In response to these challenges, we propose generativity as a powerful alternative, a cultural and practical approach capable of fostering creativity, innovation, collaboration, and the development of new social and economic frameworks that emphasize long-term well-being over short-term gains. Generativity encourages regenerative practices, i.e., practices that systematically sustain ecological balance and social equity, positioning businesses as key agents of change.

Central to this transformation is the concept of corporate purpose, which serves as a guiding principle for businesses to define their role in society beyond profit generation. More specifically, a pro-social corporate purpose reflects an organization's commitment to align its strategic economic goals with broader social and environmental concerns. By integrating purpose into their core identity, businesses can contribute to the common good, foster stakeholder engagement and strengthen their capacity to address complex global challenges. By creating shared value, purpose-driven organizations are better equipped to balance financial performance with social impact, offering meaningful contributions to their communities while enhancing employee motivation and trust.

Closely tied to this vision is the concept of responsible innovation, which emphasizes the ethical and societal dimensions of technological and organizational advancements. Responsible innovation ensures that businesses adopt forward-looking strategies that prioritize long-term social value, inclusiveness and accountability. This approach requires organizations to anticipate potential risks, engage stakeholders in decision-making processes, and actively design innovations that contribute to societal well-being. By integrating responsible innovation into their practices, businesses can transition away from purely performance-driven models and adopt more sustainable strategies that foster resilience and adaptability.

Generativity, purpose, and responsible innovation are all deeply connected to the concept of biodiversity, which plays a vital role in counteracting the growing dominance of uniformity and de-differentiation in economic and social systems. Biodiversity, in this context, extends beyond environmental conservation to encompass diverse business models, organizational structures and innovative approaches. By promoting variety in entrepreneurial practices and encouraging flexible solutions, biodiversity reinforces resilience and strengthens the capacity of businesses to thrive.

Our research aims to provide empirical evidence of the connections between generativity, corporate purpose, responsible innovation and biodiversity. To achieve this, we have designed a quantitative study that involves distributing structured questionnaires to 200 micro-enterprises and 200 SMEs across Italy. The questionnaire explores multiple dimensions of these themes using Likert scales (5-point and 7-point) and multiple-choice questions informed by recent literature and validated by two research groups.

We anticipate that our findings will offer valuable insights into how generativity shapes corporate purpose, how responsible innovation can strengthen biodiversity, and how these interconnected themes collectively foster purpose-driven business practices. By examining micro-enterprises and SMEs, often overlooked in research on responsible business, our study highlights the potential of these smaller organizations to act as catalysts for meaningful change. Ultimately, our goal is to build a conceptual framework that supports businesses in transitioning from a growth-focused economic model to one that prioritizes generativity and biodiversity. By integrating purpose into their strategies, businesses can unlock new pathways to responsible innovation, biodiversity preservation and shared value creation.

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Framing of the research. *This research is situated within the broader context of the pressing crises that define the contemporary world, which have been significantly influenced by the societal shift from a culture of necessity to one of desire, particularly in the wealthier nations (Bauman and Magatti, 2007). More specifically, Magatti argues that the paradox of desire lies in the fact that, despite living in an age obsessed with it, desire is actually diminishing. Modernity attempts to define, possess, and satisfy desire, reducing it to concepts like happiness, interest, and utility, which ultimately strip it of its depth. In this transformation, desire is desecrated rather than safeguarded, leading to an endless yet futile attempt to fill what can never truly be satisfied. This transformation, while accompanying an unprecedented era of economic growth, has also triggered a series of severe social, environmental, and economic problems that characterize the "anthropocene", an epoch defined by human-induced changes to the planet (Magatti and Giaccardi, 2024). These interconnected challenges, ranging from environmental degradation to rising social inequalities, demand an urgent and multifaceted response. Central to this response is the need for a profound shift in our cultural, social, and economic paradigms, particularly in how we approach business and its role in society (Giaccardi and Magatti, 2022). In addressing these crises, the project will focus on two core elements: generativity and corporate purpose, exploring how these concepts can drive the necessary change.*

Generativity, in this context, refers to both a cultural and practical response to crises, emphasizing long-term and system thinking, and the cultivation of systems that generate positive, lasting outcomes for society and the environment (Magatti and Giaccardi, 2014; Magatti and Giaccardi, 2024). The study will explore how generative practices - those that focus on nurturing wellbeing, life, culture, and the environment can provide a viable alternative to current patterns of exploitation and consumption. The concept of corporate purpose, which has gained prominence in recent years (e.g., George et al., 2023), will be examined as a critical tool for guiding organizations toward the need to contribute to the common good.

Purpose of the paper. *The purpose of this paper is to develop a deep understanding of how generativity and corporate purpose can contribute to a shift toward biodiversity. This study seeks to explore how these two concepts can serve as critical drivers in transforming business models, especially in the context of SMEs, towards more responsible, sustainable, and biodiverse approaches. By combining these two emerging fields, we aim to provide a fresh perspective on how businesses can align their operations with broader societal and environmental goals, moving beyond traditional profit-maximization strategies to focus on long-term value creation and positive social impact (Asselle and Piccaluga, 2019).*

Generativity is a central concept in this paper, representing the drive to create new, life-affirming systems that promote ecological sustainability, social well-being, and economic equity. Generative practices are those that focus on long-term solutions rather than short-term gains, emphasizing responsible innovation that not only seeks profitability but also aims to restore and regenerate the environment, create social value, and contribute to the common good (Magatti and Giaccardi, 2014; Magatti and Giaccardi, 2024). We will investigate how generativity can be embedded within the corporate purpose of SMEs, fostering a culture that prioritizes responsibility, long-term sustainability, and the creation of shared value. Generative businesses are not merely reactive to crises but proactive in designing solutions that address the root causes of these issues, contributing to the regeneration of both their communities and the environment.

Corporate purpose, as explored in this paper, extends beyond the traditional view of a company's role in society. It is no longer sufficient for a business to operate solely to maximize profit. A company's purpose must now include creating value for all its stakeholders: employees, customers, local communities, and the broader society. George et al. (2023) define purpose in for-profit companies as "the essence of an organization's existence by explaining what value it seeks to create for its stakeholders. In doing so, purpose provides a clear definition of the firm's intent, creates the ability for stakeholders to identify with, and be inspired by, the firm's mission, vision, and values, and establishes actionable pathways and an aspirational outcome for the firm's actions" (p. 1847). We will examine how SMEs can embrace a purpose-driven approach, integrating it into their strategic vision and daily operations. The integration of corporate purpose with generativity presents an opportunity to transition from a purely financial-driven mindset to one that actively contributes to the common good (Cucino et al., 2023). Consequently, we formulated our first research hypothesis:

Hypothesis 1 (H1): *Corporate purpose positively contributes to generativity.*

This paper will investigate how the combination of generativity and corporate purpose can also drive responsible innovation within companies. Von Schomberg (2013) defines responsible innovation as "a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products" (p. 19). By fostering an innovative mindset that embraces generative principles and aligns with a clear corporate purpose, SMEs can develop solutions that address the most pressing global challenges, such as environmental degradation, inequality, and resource scarcity. We will explore how SMEs can use responsible innovation not just to compete in the market, but to become agents of change that help drive a shift toward more generative systems. Consequently, we formulated our second research hypothesis:

Hypothesis 2 (H2): *Responsible innovation positively moderates the relationship between corporate purpose and generativity, such that the relationship is stronger when responsible innovation is high.*

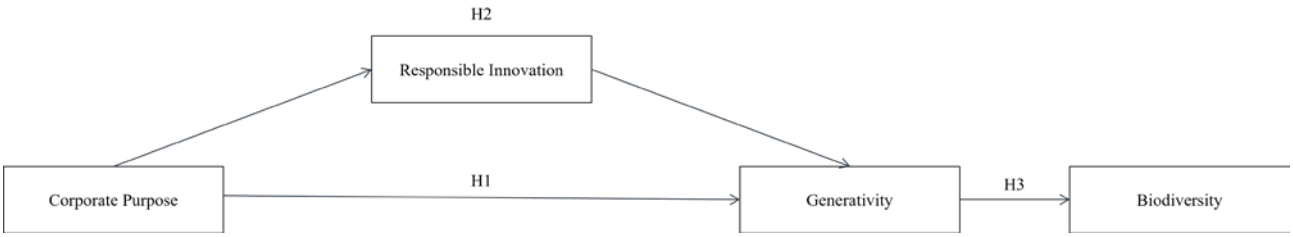
Additionally, the paper will explore how these concepts, generativity and corporate purpose, interact with biodiversity, another crucial factor in the sustainability transition. Biodiversity is not just an environmental issue but a central component of both social and economic well-being. The preservation of biodiversity is critical to maintaining

healthy ecosystems, which in turn support human life and prosperity. We will explore how SMEs, through their generative and purpose-driven activities, can contribute to the protection and restoration of biodiversity, whether by implementing sustainable practices, promoting circular economies, or innovating products and services that benefit both nature and society. By connecting these themes, we aim to offer a holistic framework for understanding how SMEs can drive sustainability at both the business and societal levels. Consequently, we formulated our third research hypothesis:

Hypothesis 3 (H3): *Generativity positively contributes to biodiversity.*

Through the empirical analysis of Italian micro-enterprises and SMEs, we will collect data that supports the theoretical connections between these concepts, testing the following research model:

Fig. 1: Research model



This research will provide valuable insights into how SMEs can actively contribute to the achievement of sustainability goals, offering evidence-based recommendations for businesses to align their strategies with generativity and corporate purpose. The findings will contribute to the growing body of literature on sustainable business practices, particularly in the context of smaller enterprises, and offer a new perspective on how these businesses can serve as catalysts for positive social, environmental, and economic change. While much research has focused on large corporations as the primary drivers of change, small and medium-sized enterprises (SMEs) have often been overlooked despite their potential to influence broader economic and social dynamics. This study intends to bridge that gap by focusing on SMEs, particularly Italian micro-enterprises and small businesses, to understand how they can integrate generativity and purpose into their practices. The research will seek to answer how these enterprises can move from being seen as merely profit-driven entities to becoming key contributors to societal well-being and environmental sustainability. By exploring the interconnections between generativity, corporate purpose, responsible innovation, and biodiversity, we aim to develop a comprehensive framework that will guide SMEs in their transition toward sustainability, providing empirical evidence of how they can contribute to the solution of the crises we face today.

Methodology. *The methodology for this research consists of three key phases: design, data collection, and data analysis. In the design phase, we developed a structured questionnaire for CEOs and general managers of micro-enterprises and SMEs in Italy, aimed at assessing the influence of generativity on corporate purpose, the impact of responsible innovation on biodiversity, and the combined effects of these factors. The constructs are defined based on recent literature, and each of them is measured following established frameworks. For generativity, we take into account three generativity phases and three dimensions with a 7-points Likert scale. The first phase, "creative generativity", assesses the business's ability to generate new ideas and projects. The second phase, "organizational generativity", focuses on how the business supports and nurtures ideas and projects over the long term. The third phase, "transitive generativity", evaluates the business's ability to help projects grow autonomously, with respondents rating their company's support for ongoing innovation. As far as concerns dimensions, we measure the "intertemporal" dimension to understand how the company creates value with a medium-to-long-term perspective, taking into account future generations. The "intersubjective" dimension examines the extent to which the company engages, values, and nurtures external partners. Lastly, the "contextual" dimension assesses how the company stimulates change and inspires new initiatives in the surrounding community, city, or territory.*

For corporate purpose, we refer to the construct developed by Jasinenko & Steuber (2023), which emphasizes the perceived organizational purpose by employees and its alignment with both internal values and external societal needs. The measurement of corporate purpose is grounded in a scale that evaluates four dimensions of purpose: authenticity, guidance, contribution and inspiration. This approach allows us to capture the perception of purpose as a guiding principle in strategy, with a focus on its impact on common good.

For responsible innovation, we employed the scale developed by Zhang et al. (2023). This scale focuses on four factors: anticipation, reactivity, inclusion and reflexivity. Companies are asked to rate how their innovation practices contribute to these areas, using a 7-points Likert scale. The scale is designed to capture both the degree to which innovation is integrated with responsible practices and the extent to which the organization prioritizes the inclusion of stakeholders in its innovation processes.

Finally, biodiversity is measured based on its key components: monitoring, restoration, compensation and prevention, measured with a 5-points Likert scale. This approach is informed by established practices for assessing biodiversity conservation efforts in organizations. The items capture the extent to which companies are currently engaging in biodiversity-related actions, as well as their willingness or potential interest in doing so. This approach aligns with

standard practices for assessing biodiversity conservation in organizations and helps to gauge both the current state of engagement and the potential for future involvement.

In the data collection phase, we collected data through the method of Computer-Assisted Telephone Interviews (CATI) to ensure a high response rate and representative sample. This method allows us to conduct structured interviews with business owners, managers, and directors, providing strategic insights into their organizational practices. The CATI method will facilitate real-time data collection, ensuring accuracy and reducing errors typically associated with other survey methods. The interviews will be conducted with 200 micro-enterprises and 200 SMEs across Italy, ensuring a diverse sample that reflects different industries and regional contexts. Respondents will be asked to provide their answers to the questions based on their company's current practices regarding generativity, corporate purpose, responsible innovation, and biodiversity.

In the data analysis phase, we will employ both descriptive and inferential statistical methods. Specifically, we will test our hypotheses through multiple regression models based on Structural Equation Modeling (SEM), also considering the impact of control variables such as firm size, industry, and regional context influence the results. SEM will be used to examine the causal connections and the strength of relationships between the themes, allowing us to test the theoretical framework. SEM will help us assess direct and indirect effects, providing a comprehensive understanding of the relationships between the variables. This multivariate approach will allow us to identify patterns, assess their significance, and offer a robust picture of how generativity, corporate purpose, responsible innovation, and biodiversity influence sustainability outcomes.

Results. *We anticipate that our findings will offer robust insights into the dynamic relationship between generativity, corporate purpose, innovation, and biodiversity. We expect to identify key patterns that demonstrate how generativity drives purpose-driven business strategies, fostering long-term biodiversity and innovation. Specifically, we hypothesize that companies with a strong generative orientation will demonstrate greater commitment to sustainable practices, enhanced stakeholder engagement, and increased innovation linked to social and environmental impact. Additionally, we expect our findings to reveal how biodiversity-focused strategies - both in ecological terms and in promoting diverse organizational models - enhance business adaptability and long-term viability.*

In addition to testing the proposed hypotheses, this research aims to develop a comprehensive framework for the "Generative Principle" that can serve as a practical guide for businesses. This framework will outline actionable strategies and best practices to help organizations foster generativity, leveraging corporate purpose, responsible innovation and biodiversity initiatives. By doing so, the study seeks to provide managers and decision-makers with concrete tools to enhance their positive impact on prosperity. We will analyze how responsible innovation practices strengthen biodiversity initiatives, drive environmentally conscious decision-making and helping businesses navigate the complexities of today's volatile landscape. Furthermore, we aim to provide evidence that companies embracing these interconnected themes are better positioned to transition from growth-focused capitalism to sustainability-driven models.

Research limitations. *We acknowledge several potential limitations in our study. First, the sample size, while extensive, is limited to Italian micro-enterprises and SMEs, which may restrict the generalizability of our findings to other regions or larger firms. Additionally, as our data relies on self-reported questionnaires, there is a risk of response bias. Future research should expand the scope by including international comparisons and exploring sector-specific dynamics to build on our insights.*

Managerial implications. *Our findings will offer actionable insights for managers and business leaders seeking to integrate generativity into their strategic frameworks. By adopting generativity-driven practices, firms can develop purpose-driven strategies that balance economic performance with social and environmental responsibility. Managers will gain guidance on how to foster organizational cultures that embrace innovation, collaboration, and long-term thinking. In particular, our research emphasizes the importance of cultivating a workplace environment that actively encourages experimentation, knowledge-sharing, and collective problem-solving. Managers who embed generativity principles into their leadership styles can enhance employee engagement, foster greater innovation, and improve decision-making processes that prioritize long-term value creation over short-term gains. Moreover, these insights can support businesses in building stronger stakeholder relationships, as a generative approach often aligns corporate values with social and environmental objectives.*

Additionally, the insights on biodiversity will inform businesses on how promoting diversity in organizational structures, products, and partnerships can drive resilience and innovation. By aligning these strategies with corporate purpose, managers can position their firms as forward-thinking leaders in sustainability, meeting the growing demand for ethical, environmentally responsible business practices.

Our research further highlights that by adopting generativity-focused strategies, managers can leverage biodiversity as a tool for fostering adaptability in rapidly changing market conditions. By diversifying supply chains, encouraging multi-disciplinary collaborations, and engaging in open innovation processes, firms can reduce their dependency on rigid business models and enhance their capacity to innovate in response to emerging challenges.

Originality of the paper. *This paper will offer a novel approach by integrating the emerging fields of corporate purpose and generativity within the broader context of responsible innovation and biodiversity. While current literature tends to treat these topics as separate entities, we seek to merge them into a unified framework that consider the inherent complexity of pressing societal and environmental challenges of our time. The originality of this paper lies in its conceptualization of the "Generative Principle", which serves as the central framework linking these diverse yet*

interrelated concepts. Additionally, we place a strong emphasis on the role of businesses as transformative agents capable of bridging the gap between theoretical models and real-world applications in the pursuit of biodiversity. The exploration of how businesses can contribute to generativity through actions that foster social equity and environmental well-being is particularly timely, given the current urgency for change in both societal structures and organizational practices.

A key element that distinguishes this research is its focus on micro-enterprises and SMEs, which have traditionally been overlooked in strategic and sustainability-oriented studies. While large corporations have long been the focal point of discussions on corporate responsibility and sustainable practices, smaller companies are often neglected, despite their substantial potential to foster positive change in local economies and broader societal contexts. This paper will fill an important gap in the literature by examining how micro-enterprises and SMEs can actively contribute to generativity, corporate purpose, responsible innovation and biodiversity, thus serving as key catalysts for social and environmental transformation. Through this unique lens, we aim to demonstrate that smaller enterprises, far from being mere bystanders, can drive innovation and sustainability within their respective sectors and communities.

The paper also stands out for its empirical research design, which involves surveying Italian micro-enterprises and SMEs to gather data that supports the theoretical framework. By employing a quantitative approach, this study will offer robust empirical evidence that connects the concepts of corporate purpose, responsible innovation, generativity, and biodiversity. The use of a survey allows us to directly capture insights from businesses actively engaged in sustainability practices, providing a clearer understanding of how these smaller entities are contributing to environmental and social well-being. Furthermore, this research aims to contribute to the literature by offering new insights into how businesses can shift from traditional profit-driven models to more purpose-driven models, thereby promoting a broader transition toward a sustainability-focused economy.

Keywords: *generativity; purpose; biodiversity; responsible innovation*

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Open innovation 2.0 for sustainability: the different way to implement business model innovation

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Abstract

This paper examines how startups and incumbent firms engage in Open Innovation 2.0 within innovation ecosystems to foster sustainability-oriented business model innovation. Despite the increasing importance of open innovation in driving sustainable transitions, the specific pathways adopted by different types of firms remain underexplored.

The study addresses the following research question: How do startups and incumbent firms engage in Open Innovation 2.0 to foster sustainability?

Using a multiple-case study methodology, we analyzed seven Italian benefit corporations, consisting of three startups and four incumbent firms, to identify distinct sustainable open innovation patterns.

Our findings reveal that startups and incumbents adopt notably different approaches. Startups primarily follow two distinct patterns: (1) Corporate Venture Capital (CVC)-driven sustainable innovation, where corporate venture capitalists support and orchestrate startup-driven sustainability initiatives by providing critical resources and strategic guidance; and (2) Pro-social innovation, in which social incubators facilitate ecosystem-based sustainable business development through active knowledge-sharing and stakeholder engagement.

Conversely, incumbents pursue two alternative patterns: (3) Innovability, characterized by the integration of sustainability and innovation within structured collaborative frameworks aimed at maintaining competitive advantage; and (4) Industrial symbiosis innovation, emphasizing interorganizational resource exchange and circular value creation within the innovation ecosystem.

This study contributes to the literature by clarifying how startups and incumbent firms pursue sustainability through leveraging innovation ecosystems, highlighting differences in governance mechanisms, relationships, and value creation processes. By distinguishing between startup-driven and incumbent-driven mechanisms, the research emphasizes how governance structures, collaborative dynamics, and value creation processes differ according to the type of firm involved.

From a managerial perspective, the study provides valuable insights into how diverse firms can effectively leverage open innovation ecosystems to enhance sustainable innovation.

Framing of the research. *Over the years, scholarly research has demonstrated that firms operate within networks that significantly influence their competitive advantage (Ritala et al., 2009). This relationship is particularly relevant in innovation activities, where success often depends on integrating knowledge from diverse external sources (Chesbrough, 2003). Consequently, Chesbrough introduced the open innovation paradigm, where firms acquire ideas and technologies externally and leverage their own ideas and technologies to other firms to reduce costs and accelerate the introduction of novel solutions (Chesbrough, 2003).*

In 2014, this concept evolved and was defined as a "distributed innovation process that relies on purposively managed knowledge flows across organizational boundaries, using pecuniary and nonpecuniary mechanisms aligned with the organization's business model to guide and motivate knowledge sharing" (Chesbrough & Bogers, 2014). Knowledge flows take various forms, including outside-in and inside-out (Chesbrough, 2017), as well as outside-out and inside-in (Gutmann et al., 2023). The European Commission labeled this advanced understanding as 'Open Innovation 2.0' (European Commission, 2016; Di Minin et al., 2018) to emphasize that sharing and co-creating innovation can benefit a broader spectrum of stakeholders (Curley & Salmelin, 2017).

This paradigm closely relates to the concept of innovation ecosystems, wherein innovation emerges from interactions among various actors, frequently spanning multiple industries and technological domains (Corsaro et al., 2012). Specifically, an innovation ecosystem is defined as a "group of autonomous firms and individuals whose actions, decisions, and investments are complementary, meaning their collective value is greater than the sum of individual contributions" (Baldwin, 2020). The collective value arises from relational rents derived from specific resources, knowledge-sharing routines, complementary capabilities, and effective governance (Dyer & Singh, 1998). Effective

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governance involves orchestration mechanisms that are "particularly necessary for future-oriented value creation aimed at both incremental and radical innovation" (Ritala et al., 2009, p. 572).

Furthermore, existing literature underscores a robust connection between open innovation processes and their impacts on triple bottom line performance (Curley, 2015). Specifically, the collaborative principle suggests that firms should transcend short-term economic goals by integrating environmental and social considerations into innovation processes, thereby adopting a long-term outlook (Kennedy et al., 2017; Costa & Matias, 2020). Consequently, innovation is increasingly assessed not merely by its novelty but also by its contribution to enhancing sustainability performance within ecosystems (Kennedy et al., 2017).

Purpose of the paper. *Open innovation oriented toward radical sustainability improvements requires distinct strategic and organizational patterns (Kennedy et al., 2017). Although scholarly interest in Open Innovation 2.0 has been growing, there is still a limited understanding of how firms harness ecosystem-based logics to implement sustainable business models. This paper seeks to address this gap by investigating whether startups and incumbent firms adopt different approaches when engaging with innovation ecosystems to drive sustainable transitions.*

Accordingly, the study addresses the following research question: How do startups and incumbent firms engage in Open Innovation 2.0 to foster sustainability?

The aim is to develop a nuanced understanding of the innovation practices adopted by these two categories of firms, shedding light on their distinct pathways toward sustainability through open and collaborative dynamics.

Methodology. *In seeking insights, we adopted an inductive approach to investigate Open Innovation 2.0 patterns for achieving sustainable goals. This research employed a multiple-case study methodology, as comparative analysis provides in-depth understanding of complex social phenomena (Eisenhardt, 1989). The selected cases consisted of Italian benefit corporations ('società benefit'). We chose this category of firms because, by law, they pursue a dual mission: profitability and the common good. Consequently, these corporations are mandated to innovate their products, processes, and business models from a sustainability perspective (Mion & Loza Adaui, 2020).*

Our research design incorporated both interviews and secondary data sources. Specifically, the data collection phase comprised three main stages:

Firstly, benefit corporations were identified through the AIDA database (Aida Bureau Van Dijk, 2024). We analyzed company websites and impact reports to include in the sample only those firms explicitly emphasizing sustainable innovation in their strategies and business models.

Secondly, we conducted seven semi-structured interviews with representatives from seven Italian benefit corporations, three startups and four incumbent firms. We defined:

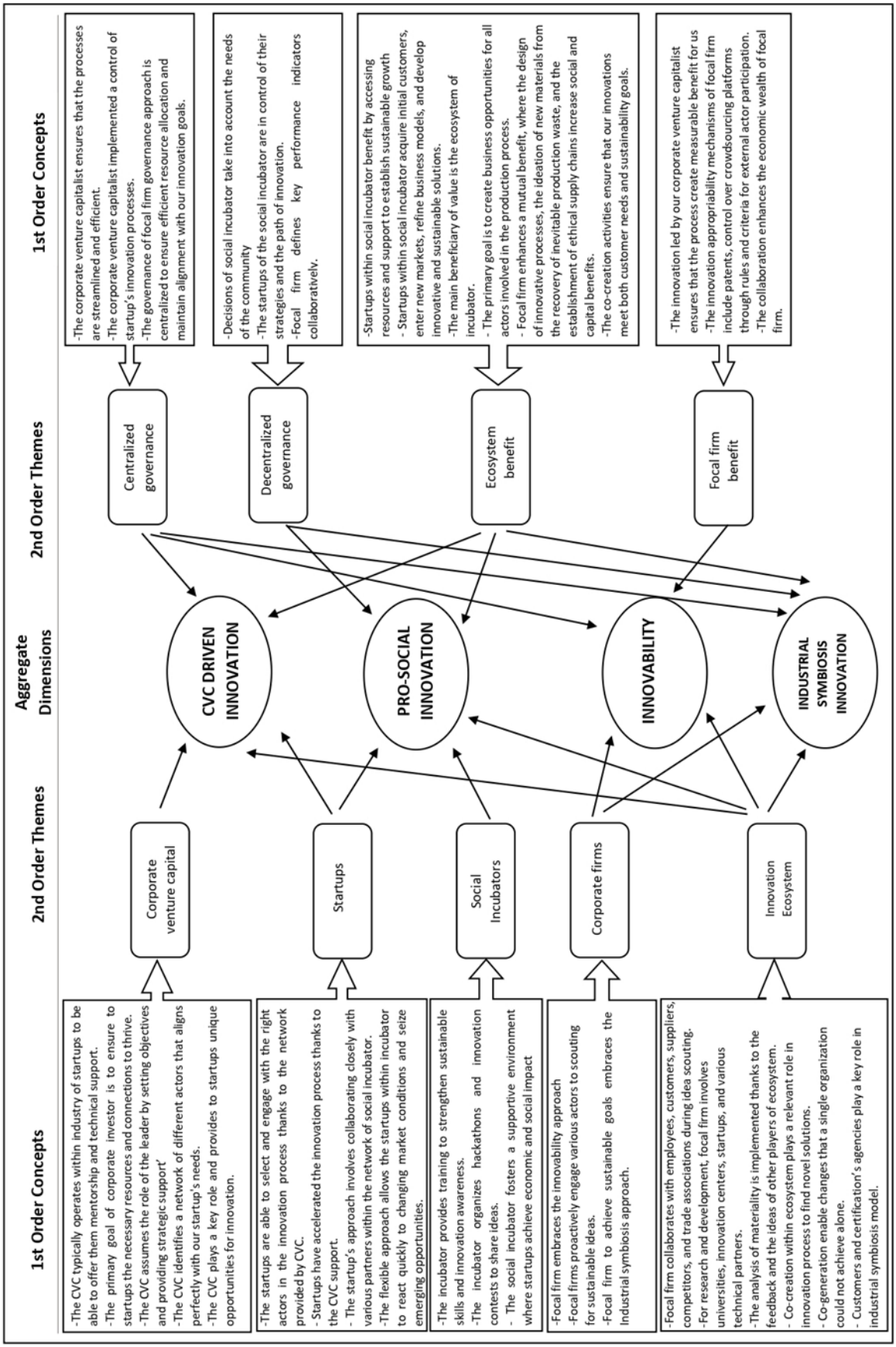
- *Startups as newly established enterprises aimed at developing and commercializing innovative products, services, or solutions. They seek to disrupt traditional industries by introducing novel technologies and addressing unmet market needs. Given the complexity, non-linearity, and resource demands of innovation processes (Chesbrough, 2003), startups often form strong external collaborations to overcome inherent constraints (Rothaermel & Deeds, 2004; Fukugawa, 2018).*
- *Incumbent firms as established enterprises with significant market presence, extensive experience, ample resources, stability, and an established customer base.*

Data collection occurred from September 2023 to January 2024. Interviews were conducted remotely via Zoom, lasted between 30 and 90 minutes, and were recorded and transcribed. A structured interview protocol ensured consistent coverage of topics, facilitating comparisons across case studies (Gioia et al., 2013). The protocol was divided into two sections: the first focusing on general firm information—such as mission, core values, industry, history, and product offerings, as well as the interviewee's role; the second section comprised questions based on literature regarding innovation ecosystems and Open Innovation 2.0. Questions addressed business processes for achieving dual missions, as well as key players, partners, and stakeholders. Consistent with Gioia, Corley, and Hamilton's approach (Gioia et al., 2013), terms such as 'ecosystem' and 'open innovation' were intentionally avoided. Secondary data—including company documents, online media articles, and official websites—were analyzed to triangulate interview insights (Yin, 2013).

Finally, collected data were analyzed following the methodology developed by Gioia et al. (2013), involving a three-step coding process: open coding, axial coding, and theoretical coding. Aggregate dimensions form the foundation for the results presented in this paper (Figure 1).

Throughout the analysis, intermediate findings were frequently reviewed with a senior researcher not involved in data collection to ensure internal consistency and external validity. Additionally, an external researcher with substantial expertise in innovation was included in the analysis process to mitigate bias, playing the role of 'devil's advocate.'

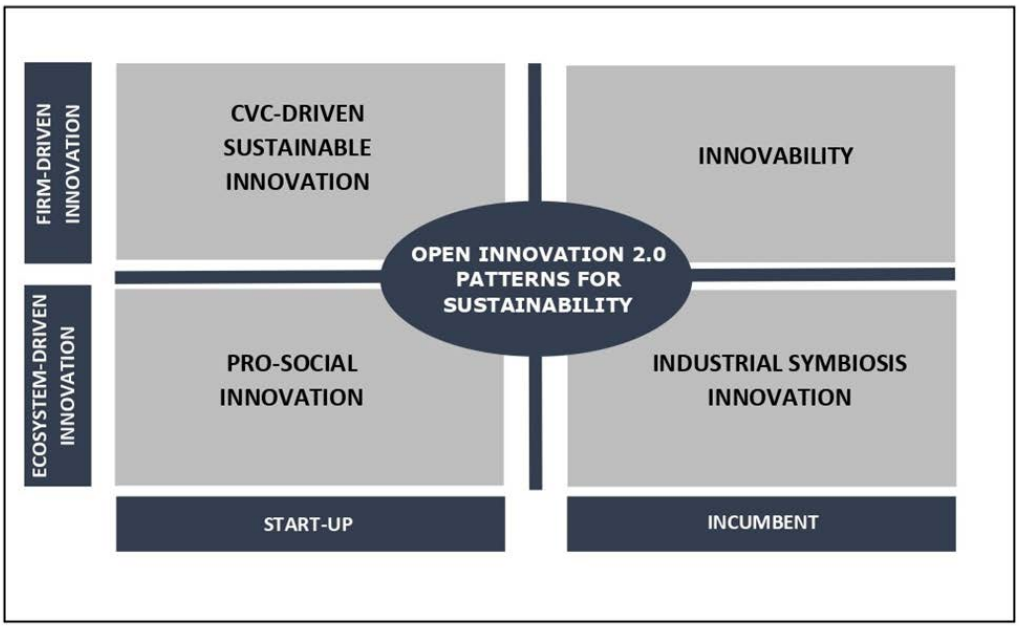
Figure 1 Data Structure



Results. *We identify four distinct Open Innovation 2.0 patterns aimed at sustainability: two patterns implemented by incumbent firms and two adopted by startups (Figure 2). To provide an in-depth description of these patterns, we focused*

on three key features drawn from literature on open innovation and innovation ecosystems: the actors involved and their relationships, governance structures, and the value captured.

Figure 2 Patterns of open innovation 2.0 for sustainability



1 - CVC-driven Sustainable Innovation Pattern:

In this pattern, impact investing is combined with a sustainability-oriented Open Innovation 2.0 approach, primarily adopted by startups during the exploitation phase. Specifically, regarding actors and their relationships, this innovation pattern mainly involves two types of organizations: the corporate venture capitalist (CVC) and the startup.

The corporate venture capitalist typically operates within the startup's industry to offer mentorship and technical expertise. It designs a tailored innovation ecosystem specifically structured to meet the startup's needs by carefully selecting relevant actors to participate in the innovation process. Consequently, the startup collaborates within an innovation ecosystem explicitly created to facilitate innovation exploitation.

Moreover, the findings indicate that interactions between these two actors follow a top-down approach (Autio, 2022). Startups depend on external partners to enhance their innovation capabilities and overcome internal limitations. The corporate venture capitalist, possessing essential resources and reputation, assumes a leadership role by setting objectives and providing strategic guidance.

Thus, governance within this Open Innovation 2.0 pattern is characterized by closed-system orchestration, with the corporate venture capitalist acting as the orchestrator. The CVC aims to capture a significant share of the created value and facilitates mechanisms for value appropriation by the startup. It seeks either to internalize the co-created value by integrating innovative solutions into its processes or commercializing new sustainable products. Alternatively, the corporate venture capitalist may choose to capture value through the development of the startup itself.

Despite this arrangement, the sustainability-oriented startup also captures substantial value, enabling it to overcome constraints related to the 'liability of newness and smallness' (Raju et al., 2011; Marozzo et al., 2023). Startups gain access to tangible and intangible resources, including human capital, facilitating increased awareness of sustainable production processes and deeper market and industry insights. Additionally, startups have the opportunity to establish valuable relationships with the investor's customers, partners, and distribution channels.

2 - Pro-social Innovation Pattern:

This pattern is implemented by social incubators involving startups aiming to introduce innovative business models addressing sustainability challenges. Specifically, our study highlights a pattern in which the incubator facilitates collaboration between startups and numerous partners within its ecosystem. The primary activities involving startups include creating sustainability-oriented businesses, training to strengthen sustainable skills and awareness, and crowdsourcing sustainable ideas through hackathons and innovation contests (Cappa, 2022; Franco et al., 2021).

Social incubators typically engage a broader array of stakeholders compared to traditional incubators. Interviewees emphasized the crucial roles of government entities, academia, and non-profit organizations in identifying relevant social and environmental challenges.

Concerning governance, our analysis identifies flexible and collaborative mechanisms. Governance is flexible as the incubator allows startups to independently manage their relationships within the ecosystem, reflecting a decentralized decision-making structure. It is also collaborative, actively engaging all ecosystem stakeholders, and decision-making processes, although autonomous, consistently consider community needs. Therefore, governance in this Open Innovation

2.0 pattern is characterized by open-system orchestration, where the ecosystem guides innovation processes with the social incubator serving as the orchestrator.

Furthermore, we characterize this open innovation pattern as pro-social due to its broader and collaborative distribution of created value, aimed at achieving collective benefits. Startups significantly benefit from participating in this incubator ecosystem. Initially, startups typically lack a customer base, cannot directly apply a predefined business model, and must establish their credibility and relevance. Their primary focus is initially on establishing viability, followed by sustainability and growth (Ojaghi et al., 2019). Consequently, the value captured by startups within an incubator's ecosystem, supported by collaborative approaches, effectively addresses their core needs.

3 - Innovability Pattern:

This pattern is implemented by incumbent firms that enhance and maintain their competitiveness through business models built on the principle of 'Innovability', defined as the integration of innovation and sustainability (De la Vega Hernández & Barcellos de Paula, 2020; Hall & Wagner, 2012; Hart & Milstein, 2003).

The primary actor is the focal firm, which proactively engages other ecosystem participants to achieve shared objectives, overcoming potential barriers to knowledge sharing. The other ecosystem actors can be grouped into three core activity categories: (1) sustainable idea scouting and the definition of key performance indicators (KPIs), (2) research and development (R&D), and (3) financial partnerships.

During the idea scouting phase, the focal firm actively seeks innovative ideas externally, following the 'outside-in' logic of open innovation (Chesbrough, 2017). Co-creation thus becomes a critical factor for successful innovation. Participants collaborating at this stage include employees, customers, suppliers, competitors, and trade associations. Additionally, the focal firm defines its objectives and KPIs based on materiality analysis.

In terms of research and development activities, the focal firm engages universities, innovation centers, technicians, startups, production partners, competitors, patent and certification agencies, and suppliers to facilitate the exchange of experiences, skills, knowledge, and technologies. Although financial stakeholders are not directly involved in open innovation processes, their indirect role is crucial as they provide financial resources, encourage sustainable business practices, facilitate sustainable investments, and promote greater business transparency.

Governance in this pattern operates through closed-system orchestration. Innovation processes are centralized, providing the focal firm with the necessary resources and legitimacy to initiate and manage innovation effectively. Acting as the orchestrator, the focal firm centrally coordinates the ideas, resources, and capabilities of other actors, primarily for its benefit (Nambisan & Sawhney, 2011). Furthermore, it takes deliberate actions to manage relationships among ecosystem participants, ensuring alignment with established goals.

The analyzed case studies illustrate that innovation co-created through open and collaborative approaches is ultimately aimed at developing sustainable products via interactions among multiple stakeholders in the value network. Other ecosystem actors capture value through strengthened relationships with the focal firm, increased economic benefits, and the assurance of environmental sustainability.

4 - Industrial Symbiosis Innovation Pattern:

In the exploration phase of innovation, incumbent firms adopt a sustainability-oriented Open Innovation 2.0 pattern rooted in the principles of industrial symbiosis. Specifically, this pattern involves the active engagement of incumbent firms in exchanging resources within their ecosystems.

The process begins when customers initiate an active, creative, and collaborative engagement aimed at co-creating value. Customers provide post-processing materials, post-consumption waste, and recyclable materials to the focal firm, which then regenerates these resources into new materials and products. Thus, co-creation in this context extends beyond traditional crowdsourcing methods (Cappa et al., 2016), incorporating direct and strategic customer involvement.

Additionally, our interviews revealed the significant role of universities and research centers in enhancing collaboration. Certification organizations also play a vital role by emphasizing product sustainability, lifecycle assessment, and cooperation across all ecosystem participants.

Within this pattern, while the entire ecosystem collaborates to shape and drive the innovation process, the focal firm coordinates the interactions. Interorganizational collaboration demands careful orchestration and effective network management (Paquin & Grenville, 2019). Thus, governance involves a balance between centralized orchestration by the focal firm and cooperative decision-making processes among ecosystem participants, combining elements of both closed and collaborative governance.

Ultimately, the goal is to create multiple business opportunities and value for all ecosystem actors. Exchanges among various stakeholders generate mutual benefits, including innovative process designs, creation of new materials from unavoidable production waste, and the development of ethical supply chains, thereby enhancing both economic and sustainability outcomes.

To clarify the differences among the various models and enhance their comparability, we introduce a comparability matrix based on three key features derived from the literature on open innovation and innovation ecosystems: the actors involved and their interrelationships, the governance mechanisms in place, and the types of value captured (Table 1).

Table 1 Characteristics of patterns of open innovation 2.0 for sustainability

PATTERNS / ELEMENTS OF INNOVATION ECOSYSTEM	CVC-DRIVEN SUSTAINABLE INNOVATION	PRO-SOCIAL INNOVATION	INNOVABILITY	INDUSTRIAL SYMBIOSIS INNOVATION
ACTORS AND RELATIONSHIP (Casalegno et al., 2020; Costa, and Matias, 2020)	-Corporate Venture Capitalist -Startup -New Tailored Innovation Ecosystem -Top-down approach	-Incubator -Startup -Innovation ecosystem of incubator -collaborative, adaptive and flexible approach	-Focal firm -Ecosystem of Focal firm -Co-creation approach	-Dissimilar businesses of different industry -New Tailored Innovation Ecosystem -collaborative, adaptive and flexible approach
GOVERNANCE (Schepis et al., 2021; Dagnino et al., 2016; Dhanaraj and Parkhe, 2006; Holgersson et al, 2022)	-Closed-system orchestration -CVC as orchestrator -Centralized approach	-Open-system orchestration -Collaborative orchestration -Decentralized approach	-Closed-system orchestration -Focal firm as orchestrator -Centralized approach	-Hybrid-system orchestration both centralized and decentralized -Centralized approach: focal firm as orchestrator -Decentralized decision-making process
VALUE CAPTURE (Chesbrough, 2007)	-Internalization of novel solutions in CVC's business model -sale of new sustainable products -startup growth	-Collaborative distribution of value created -Collettive benefit -Startup creation	-Focal firm capture the most of value created -Focal firm growth	-Collaborative distribution of value created -Collettive benefit

Research limitations. *This study has several limitations that should be acknowledged. First, the analysis relies on a limited sample of seven case studies, with only three specifically focusing on startups. As ongoing research, this work would benefit from an expanded empirical base to strengthen the robustness and generalizability of the findings. Future research could involve a broader range of case studies to verify and further validate these preliminary results. Although our initial findings provide meaningful insights, additional empirical evidence is necessary to confirm and extend our conclusions. Specifically, further studies could address whether additional open innovation patterns exist beyond those identified here and determine if there are other critical dimensions beyond the three features analyzed in this research.*

Managerial implications. *Our study offers several practical implications for managers. Sustainable innovation should become a strategic priority across all business types. The innovation patterns identified provide novel approaches to sustainable innovation, which managers can consider integrating into their business models.*

Managers should actively identify key stakeholders within the innovation ecosystem, establish meaningful collaborations, and pursue partnership opportunities or develop ecosystems proactively.

Startup managers need to carefully examine appropriate governance methods for their contexts, while managers of incumbent firms should evaluate how best to adjust their decision-making structures to support sustainable transitions using Open Innovation 2.0 principles. This adjustment may involve developing decentralized governance structures.

Incumbent firm managers must be prepared to thoroughly analyze the dynamics of sustainable innovation ecosystems and adapt their business strategies accordingly. Such adaptation requires an open mindset toward innovation, the ability to foster effective relationships with diverse ecosystem stakeholders, and flexibility in modifying governance mechanisms and value-capture strategies to align with evolving ecosystem dynamics.

Originality of the paper. *This study provides practical implications for managers. Sustainable innovation should be strategically prioritized across all business types. The patterns identified offer innovative approaches to sustainability, and managers may benefit from integrating these into their business models.*

Managers should actively identify key stakeholders within the innovation ecosystem, establish effective collaborations, and pursue partnership opportunities or ecosystem development proactively.

Startup managers should closely evaluate governance mechanisms suited to their context, while incumbent firm managers should explore adapting their decision-making structures to facilitate sustainable transitions based on Open Innovation 2.0 principles. Such adaptations may involve decentralizing governance to better align with sustainability goals.

Moreover, incumbent firm managers should closely examine the dynamics of innovation ecosystems and adapt their business practices to the identified patterns. Achieving this requires cultivating an open mindset toward innovation, building effective relationships with various ecosystem actors, and demonstrating flexibility in governance and value-capture strategies in response to evolving ecosystem dynamics.

Key words: *open innovation 2.0; sustainability; innovation ecosystem; sustainable innovation patterns; startups; incumbents*

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Humane Entrepreneurial Orientation: Strategic Posture and Performance Implications Across Italian Firms

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Abstract

This study investigates the emergence and performance implications of Humane Entrepreneurial Orientation (HEO) across a diverse sample of Italian industrial firms. Building on the theoretical framework of Humane Entrepreneurship, this research explores the relationship between HEO-derived from the integration of Entrepreneurial Orientation (EO), Human Resource Orientation (HRO), and Sustainability Orientation (SO)- and firms' financial, social, and environmental performance. To gather data, a structured survey was administered to 200 firms randomly selected from the AIDA database, ensuring a comprehensive and representative sample of micro, small, medium, and large enterprises. Using cluster analysis, the study identifies the presence of HEO across organizations. Additionally, regression analysis is employed to examine the relationship between Humane Entrepreneurial Orientation and firm performance, assessing its impact on key outcomes in the economic, social, and environmental domains. The findings are expected to contribute to the theoretical development of HEO, providing a deeper understanding of how Humane Entrepreneurship influences firms' performance. Moreover, they offer practical implications for managers seeking to cultivate sustainable, inclusive, and ethically driven business models that generate long-term competitive advantage.

Framing of the research. *In recent years, the entrepreneurial discourse has increasingly converged with global calls for sustainable and inclusive development, prompting a rethinking of the firm's role in society. As business environments grow more complex and socially accountable, there is a growing demand for models of entrepreneurship that reconcile competitive advantage with ethical, human-centered, and sustainability-driven practices. In this evolving landscape, Humane Entrepreneurship (HumEnt) has emerged as a promising paradigm that embeds the wellbeing of people and the planet into the core logic of entrepreneurial action (Kim et al., 2018; Parente et al., 2018).*

Theoretically, the HumEnt framework, as proposed by Parente et al. (2018) integrates principles from Servant Leadership theory (Barbuto and Wheeler 2006; Greenleaf 1977; Russell and Stone 2002; Van Dierendonck 2011) and Corporate Social Responsibility Theory (CSR - McWilliams and Siegel 2001), and operationalizes them through the concept of Humane Entrepreneurial Orientation (HEO). HEO consists of three interrelated strategic orientations: Entrepreneurial Orientation (EO), reflecting proactiveness, risk-taking and innovation (Covin and Slevin, 1989); Human Resource Orientation (HRO), which centers on empathy, equity, enablement, and empowerment of employees (Kim et al., 2018); and Sustainability Orientation (SO), denoting a firm's commitment to both environmental and societal wellbeing (Muñoz and Dimov, 2015; Parente et al., 2021). All together, these dimensions represent an enlarged strategic posture that positions HEO not as peripheral, but as integral to business success across financial, social, and environmental domains.

While the theoretical foundations of HumEnt are increasingly articulated and supported by recent efforts to develop validated measurement tools (Parente et al., 2021; Vesci et al., 2023), empirical studies remain limited in number and scope (Vesci et al, 2024 a,b). Buratti et al. (2022) focuses on social enterprises suggesting that the adoption of the HumEnt perspective can make Community Enterprise more able to survive and grow in depleted contexts. De˛Bicka et al. (2022), investigates HumEnt employees' perception and to what extent elements of the HumEnt model are implemented in the practices of firms. Anggadwita et al. (2021) proposes a third study centered on the implementation of Humane Entrepreneurship in educational context. All these studies are primarily based on case analyses (Vesci et al. 2023; Buratti et al. 2022), often relying on a limited number of firms or single-sector samples, which may not fully capture the diversity of approaches to humane entrepreneurship across different types of organizations. Although useful, these studies may offer only a partial view of how HEO is enacted in practice, leaving unexplored the broader population of firms that may

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embody humane entrepreneurial orientations without institutional recognition. There remains a significant gap in understanding the natural diffusion, internal variation, and real-world impact of HEO across firms with different characteristics and strategic profiles.

Purpose of the paper. *This paper aims to broaden the empirical understanding of Humane Entrepreneurial Orientation by examining how its core dimensions-EO, HRO, and SO-manifest across a diverse and randomly selected set of firms. Specifically, the study pursues two objectives: first, to identify clusters of firms on the basis of the HEO dimension (Vesci et al. 2024b); and second, to assess how these clusters relate to multidimensional performance outcomes, including financial stability, social impact, and environmental responsibility. Additionally, the study employs regression analysis to examine the effects of the HEO dimensions on firm performance, providing a deeper insight into their individual and combined impact. By adopting an inclusive and exploratory approach, the paper contributes to the refinement of the HumEnt construct and its operationalization in empirical research. In doing so, it sheds light on the strategic postures that underpin sustainable competitive advantage and offers evidence-based insights for both scholars and practitioners interested in embedding humane principles into entrepreneurial ecosystems.*

Methodology. *This study adopts a positivist research paradigm and a quantitative, exploratory design to investigate how Humane Entrepreneurial Orientation (HEO) manifest itself across a heterogeneous population of firms, and how it relates to multidimensional performance outcomes. In line with the study's dual aims- (1) to identify clusters of firms based on their alignment with the dimensions of Humane Entrepreneurship, and (2) to analyze the relationship between these clusters and firms' financial, social, and environmental performance-a quantitative method with structured survey was employed.*

The empirical investigation was conducted through an online questionnaire administered to a random sample of 200 Italian firms selected from the AIDA database (Analisi Informatizzata delle Aziende Italiane), which provides comprehensive, verified data on companies across various sectors and sizes. The selection focused exclusively on industrial enterprises, ensuring sectoral consistency. Firms were classified based on their size-micro, small, medium, and large-according to standard criteria using revenue and number of employees (European Commission, 2003). Additionally, to capture geographical diversity, the sample was stratified across Italy's major macro-regions: North, Center, South, and Islands. Notably, no pre-selection was made based on certifications (e.g., B Corp, EMAS, Great Place to Work), ensuring an inclusive and unbiased representation of the broader business landscape. The questionnaire was designed using scales drawn from the extant literature on Humane Entrepreneurship. Entrepreneurial Orientation (EO) was measured using the nine-item scale developed by Covin and Slevin (1989), capturing innovativeness, risk-taking, and proactiveness. Sustainability Orientation (SO) was assessed through seven items adapted from Muñoz and Dimov (2015), reflecting firms' strategic commitment to environmental and societal responsibility. Human Resource Orientation (HRO) was operationalized using the eight-item scale proposed by Kim et al. (2018), incorporating empathy, equity, enablement, and empowerment dimensions. All items were measured on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). Firm performance was captured through three composite indicators: financial performance (e.g. profitability, revenue growth, and return on investment) adapted from Chirico et al. (2011), social performance (e.g. employee well-being, stakeholder engagement, and corporate social responsibility) adapted from Asiaei and Jusoh (2017), and environmental performance (e.g. environmental impact reduction) adapted from Gopalakrishna-Remani et al. (2022). Respondents were asked to self-assess their organization's performance in these areas over the past three years relative to industry peers.

Data are analyzed in two stages. First, a cluster analysis is performed to identify distinct strategic postures based on firms' responses to the EO, HRO, and SO items. This step allows for the empirical identification of emergent configurations of Humane Entrepreneurship beyond predefined labels or typologies. In the second stage, ANOVA and post-hoc tests are conducted to assess whether the identified clusters differed significantly in terms of their reported financial, social, and environmental performance. Finally, multiple regression analysis is conducted to explore the predictive relationships between HEO dimensions and firm performance outcomes. This statistical approach provides a deeper understanding of how different combinations of humane strategic orientations contribute to overall firm success.

Results. *The empirical analysis aims to identify distinct clusters of firms based on the Humane Entrepreneurial Orientation (HEO). Through cluster analysis, we expect to uncover different types of firms ranging from companies that exhibit a balanced and integrated alignment across Entrepreneurial Orientation (EO), Human Resource Orientation (HRO), and Sustainability Orientation (SO) to those that emphasize only one or two of these dimensions. This typology moves beyond normative classifications or certification-based assumptions, offering a data-driven perspective on how humane entrepreneurship is embedded in diverse business contexts*

Regression analysis further tests the relationship between HEO and firm performance across financial, social, and environmental dimensions. Preliminary results indicate that firms with a high degree of alignment across all three HEO components tend to exhibit superior performance across multiple metrics, supporting the theoretical proposition that humane entrepreneurship fosters sustainable competitive advantage. Specifically, a fully integrated humane strategic posture is positively associated with financial profitability, employee well-being, and environmental responsibility, suggesting that firms do not need to trade off economic and social/environmental goals but can achieve synergies among them. Conversely, firms that underemphasize human resource or sustainability dimensions-despite maintaining a strong entrepreneurial orientation-tend to exhibit weaker performance in social or environmental domains, even when financial indicators remain stable. This reinforces the idea that a partial or symbolic adoption of humane entrepreneurship may be insufficient to generate long-term organizational benefits.

Additionally, exploratory analyses suggest that sectoral and size-related patterns influence the adoption of humane strategic postures. For instance, larger firms may exhibit a more structured approach to integrating HEO principles, while SMEs might demonstrate flexibility in their implementation but face resource constraints that affect their ability to maintain a balanced orientation. Furthermore, geographic differences may emerge, with firms in different regions displaying varying degrees of emphasis on sustainability and employee well-being. These contextual insights contribute to a deeper understanding of the enabling and constraining factors that shape the practical adoption of humane entrepreneurship.

Research limitations. *Despite its contributions, this study presents several limitations that warrant consideration. First, the use of self-reported data for both strategic orientation and firm performance may introduce common method bias and social desirability effects. Although the survey design aimed to minimize these risks, future research would benefit from triangulating self-reported measures with objective data or third-party assessments to enhance the robustness of findings. Second, the cross-sectional nature of the analysis restricts the ability to examine how Humane Entrepreneurial Orientation (HEO) evolves over time. Longitudinal studies are needed to capture the dynamic interplay between entrepreneurial posture and performance outcomes, particularly in response to changing organizational or environmental conditions. Finally, the generalizability of the findings is limited to the Italian context. While the random sampling strategy increases internal validity, institutional and cultural differences across countries may influence the interpretation and application of humane entrepreneurship principles. Cross-national comparative studies would offer valuable insights into how contextual factors shape the enactment of HEO.*

Managerial implications. *This study offers several significant implications for managers who are seeking to align competitive strategy with a HEO. In an era where businesses are increasingly scrutinized not only for their financial performance but also for their social and environmental impact, aligning corporate strategies with humane values is becoming essential for long-term success. By identifying distinct clusters of firms based on their Humane Entrepreneurial Orientation (HEO), the research provides a diagnostic framework through which organizations can evaluate their current strategic posture and identify areas for development. This framework allows managers to assess how well their firm integrates key elements such as entrepreneurial dynamism, employee well-being, and societal responsibility-not as isolated initiatives, but as interconnected strategic levers that can drive sustainable performance across multiple dimensions. The study's findings expect that firms exhibiting a balanced integration of the three core dimensions of HEO-Entrepreneurial Orientation (EO), Human Resource Orientation (HRO), and Sustainability Orientation (SO)-tend to outperform others in financial, social, and environmental dimensions. This highlights the importance of pursuing a holistic approach to strategy, rather than focusing narrowly on one domain such as innovation or sustainability alone. In fact, the research indicates that firms that successfully integrate all three dimensions are better positioned to create sustainable value, foster employee loyalty, and engage meaningfully with broader society. Managers are therefore encouraged to embed HEO not just in external communications or formal policies, but deeply into the day-to-day practices of leadership, human resource management, and strategic decision-making. By making these values an integral part of organizational culture, companies can enhance their ability to adapt to changing market demands, navigate complex regulatory environments, and meet the expectations of increasingly conscious consumers and investors.*

Moreover, the study challenges the common assumption that only certified or "best-in-class" firms, such as those with B Corp certification or other recognized sustainability labels, can effectively operationalize humane entrepreneurship. While such certifications are undoubtedly valuable, this research underscores that even in the absence of formal recognition, firms of all sizes and stages of development can cultivate a humane strategic posture that supports long-term competitiveness and resilience. This creates opportunities for a broader set of organizations-especially SMEs, startups, and emerging businesses-to consider HEO as a viable and accessible model for growth. For small and medium-sized enterprises (SMEs) in particular, HEO can serve as a unique differentiator in a competitive marketplace, offering a path to build a reputation for ethical business practices and social responsibility, which can be critical for attracting customers, talent, and investment.

The research also highlights the importance of HumEnt in translating this enlarged strategic posture into actionable strategic outcomes, since managers and entrepreneurs are key to embedding humane values in every facet of the organization, from day-to-day operations to strategic decision-making. By investing in human resources empathy, empowerment, and ethical social and environmental responsibility, companies can build a culture that not only promotes entrepreneurial innovation but also prioritizes the well-being of employees and the broader community. Furthermore, managers must be equipped with the tools, skills, and competencies necessary to translate humane values into tangible outcomes. This requires ongoing investment in leadership training and development, as well as a commitment to continuous learning about how to integrate human-centered practices into business operations (Kim et al. 2018). Leaders should be encouraged to model the behaviors they wish to see in their teams, demonstrating empathy, transparency, and a commitment to social and environmental stewardship. By doing so, they can set the tone for the entire organization, reinforcing the idea that doing good is not only the right thing to do, but also a driver of long-term business success.

In sum, this study provides a valuable framework for entrepreneurs and managers seeking to navigate the complexities of modern business environments, where the integration of human-centered and sustainability-driven values is no longer optional but essential for long-term success. The insights gleaned from this research encourage firms to adopt a more inclusive, balanced, and humane approach to strategy, one that harmonizes entrepreneurial dynamism with social

responsibility and environmental stewardship. By doing so, businesses can not only create a competitive advantage but also contribute meaningfully to the broader goal of building a more sustainable and ethical global economy.

Originality of the paper. *This study provides a novel contribution to the field of Humane Entrepreneurship by advancing the operationalization of the Humane Entrepreneurial Orientation (HEO) construct. By leveraging validated multi-dimensional scales and applying a data-driven clustering approach, the study identifies firms that reflect varying degrees of alignment between Entrepreneurial Orientation (EO), Human Resource Orientation (HRO), and Sustainability Orientation (SO). This methodological advancement enables a more nuanced analysis of how these three dimensions interact in practice and how different levels and presence of HEO in sample's firms relate to firm performance across financial, social, and environmental indicators. Furthermore, by complementing cluster analysis with regression techniques, the study provides robust statistical evidence on the impact of humane entrepreneurship on firm outcomes, reinforcing the theoretical and practical relevance of HEO.*

From a methodological standpoint, the research design contributes to the literature by offering a replicable and adaptable framework that can be applied across different industries, firm sizes, and geographic contexts. By decoupling humane entrepreneurship from formal certifications and investigating its organic distribution in the business landscape, the study provides a fresh perspective on the strategic integration of HEO. This perspective challenges the assumption that only explicitly ethical or sustainability-oriented firms can leverage HEO for competitive advantage. Instead, the findings suggest that humane entrepreneurship is a strategically relevant paradigm for a broader spectrum of firms, including SMEs and industrial enterprises that may not traditionally be associated with sustainability-driven business models. Ultimately, this study contributes to bridging the gap between theory and practice by demonstrating that humane entrepreneurship is not merely a normative ideal but a measurable, performance-relevant orientation that can enhance long-term competitiveness and resilience. By providing empirical insights into the configurations and performance implications of HEO, the research informs both scholars and practitioners, offering a foundation for future studies and managerial applications in the field of sustainable and human-centered entrepreneurship

Key words: *Humane Entrepreneurship; Strategic Posture; Entrepreneurial Orientation; Human Resource Orientation; Sustainability Orientation; Firm Performance*

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Ruolo dei facilitatori nell'Open Social Innovation: processi di co-creazione a supporto della fragilità

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Abstract

Il presente lavoro analizza approfonditamente il ruolo cruciale svolto dai facilitatori negli ecosistemi di Open Social Innovation, ponendo particolare attenzione ai processi partecipativi indispensabili per affrontare sfide sociali complesse quali la fragilità umana, il cambiamento climatico, le pandemie e le disuguaglianze. L' Open Social Innovation, intesa come paradigma che mobilita risorse, competenze e conoscenze tra numerosi stakeholder - imprese, cittadini, istituzioni pubbliche e società civile - emerge come risposta efficace alle sfide emergenti e come modello per la co-creazione di soluzioni condivise. Nonostante l'interesse crescente, la letteratura evidenzia ancora una notevole lacuna nell'analisi del contributo specifico dei facilitatori, figure essenziali per orchestrare e guidare dinamiche di apprendimento collettivo e co-creazione. Mediante una metodologia qualitativa e un approccio longitudinale che ha coinvolto interviste semi-strutturate e l'analisi di documenti ufficiali nel periodo 2020-2025 - con particolare riferimento al concorso Make To Care - questo studio individua quattro percorsi operativi attraverso cui i facilitatori generano impatti sociali: il coinvolgimento degli utenti guida, l'amplificazione delle soluzioni esistenti, la creazione di alleanze centrate sui problemi e il rafforzamento degli ecosistemi locali. Il modello proposto contribuisce al dibattito teorico e offre strumenti pratici per la gestione di ecosistemi di innovazione sociale, proponendo strategie replicabili per trasformare le sfide in opportunità di sviluppo sostenibile e inclusivo.

Inquadramento della ricerca. *Le grandi sfide sociali contemporanee, come la fragilità umana, il cambiamento climatico, le pandemie e le crescenti disuguaglianze, richiedono modelli innovativi basati su azioni collettive e imprenditoriali che coinvolgano cittadini, governi, istituzioni e organizzazioni sia private sia della società civile (Chesbrough & Di Minin, 2014; Bogers et al., 2020; McGahan et al., 2021; Seelos et al., 2023). In questo scenario complesso e in continua evoluzione, l'Open Social Innovation si configura come un paradigma fondamentale, capace di favorire processi partecipativi di co-creazione che coinvolgono stakeholder eterogenei (Mair & Gegenhuber, 2021; Bertello et al., 2022; Mair et al., 2023). Tale modalità non solo consente la generazione di nuove soluzioni innovative, ma permette anche di potenziare e amplificare quelle già esistenti, agevolando l'apprendimento condiviso e accelerando la risoluzione delle problematiche sociali (Chesbrough & Di Minin, 2014; Bogers et al., 2020). Tuttavia, rimane ancora un importante gap di ricerca per quanto concerne il ruolo e l'impatto specifico dei facilitatori nella gestione e nell'implementazione di tali processi, soprattutto in contesti caratterizzati da elevata fragilità umana (Terstriep et al., 2021; Audretsch et al., 2022; Cucino et al., 2023). Questo studio si propone, quindi, di approfondire come i facilitatori possano operare efficacemente per orchestrare la co-creazione, favorendo l'integrazione delle conoscenze e delle competenze provenienti da diverse fonti, al fine di affrontare le sfide sociali più urgenti in maniera rapida e sostenibile.*

Obiettivo del paper. *L'obiettivo principale di questo studio è duplice. In primis, si intende analizzare in modo approfondito il ruolo dei facilitatori nel promuovere e orchestrare processi partecipativi di co-creazione all'interno degli ecosistemi di Open Social Innovation. L'analisi mira a evidenziare come tali figure, grazie all'uso di metodologie partecipative e strumenti di coordinamento, riescano a mettere in connessione competenze eterogenee e a favorire l'emergere di soluzioni innovative capaci di rispondere a sfide sociali complesse. In secondo luogo, il lavoro si propone di sviluppare un modello generalizzabile per la creazione e la gestione di ecosistemi di innovazione sociale, con particolare attenzione alle condizioni necessarie per replicare e scalare le soluzioni sviluppate. Il modello proposto intende fornire un framework operativo che possa essere utilizzato da manager, responsabili di progetto e decisori politici per implementare strategie di l'Open Social Innovation in vari contesti, trasformando le problematiche in opportunità di sviluppo sostenibile e inclusivo.*

Le domande di ricerca principali a cui il presente studio intende rispondere sono: in che modo i facilitatori attivano e sostengono processi partecipativi di co-creazione? Quali sono le strategie operative che consentono di generare impatti sociali misurabili, come l'inclusione e il miglioramento della qualità della vita? Infine, come possono essere integrate le

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prospettive teoriche classiche dell'Open Innovation con quelle emergenti relative all'innovazione sociale per formulare un modello operativo applicabile a diversi contesti?

Metodologia. *Per rispondere alle domande di ricerca, è stata adottata una metodologia qualitativa di tipo induttivo (Denzin&Lincoln, 2011; Corbin& Strauss, 2014), che ha permesso un'esplorazione approfondita su come le persone fragili siano state coinvolte attivamente come partner nei processi di innovazione sociale. Il contesto empirico scelto per lo studio è rappresentato dall'iniziativa MakeToCare, lanciata nel 2016 da Sanofi-Genzyme, la divisione specializzata di Sanofi operante in ambiti quali malattie rare, disturbi ematici rari, neurologia, immunologia e oncologia. Make To Care è concepita come un concorso che consente agli innovatori di presentare le proprie soluzioni originali legate alla fragilità umana a un vasto ecosistema di attori, il quale comprende imprese, venture capitalist, ospedali, pazienti e varie istituzioni. Per queste caratteristiche, Make To Care rappresenta un punto di raccolta significativo di innovazioni sociali, caratterizzato da procedure e tempistiche ben definite, da obiettivi chiaramente non profit e dalla volontà esplicita di sviluppare reti di cura efficaci e collaborative.*

Nel dettaglio, il concorso Make To Care si configura come una call annuale rivolta a maker e innovatori che hanno sviluppato soluzioni pratiche per rispondere ai bisogni quotidiani, sia personali che di persone a loro care, come genitori, amici o altri individui che vivono condizioni di fragilità o disabilità. Seguendo un approccio di care design (Hamington, 2019), Make To Care stimola una riflessione critica e collettiva volta a produrre risultati orientati direttamente alle esigenze degli utenti finali (Von Hippel, 1986). Inoltre, l'iniziativa promuove la costruzione di una comunità tra gli innovatori operanti nel campo della fragilità, mantenendo una stretta connessione con la Maker Fair di Roma (www.makerfairerome.eu). Ogni anno, le candidature pervenute vengono valutate e le soluzioni più promettenti vengono presentate durante un evento pubblico annuale che si svolge in autunno a Roma. I finalisti e, soprattutto, i vincitori hanno l'opportunità di entrare in contatto con partner accademici e industriali facenti parte della rete Make To Care. I partecipanti provengono da diverse categorie, tra cui studenti delle scuole superiori o universitari, giovani ricercatori universitari, persone fragili, genitori e parenti di persone fragili, nonché associazioni di pazienti fragili.

Per garantire robustezza ed efficacia nella ricerca, è stato adottato un approccio di raccolta dati multi-fonte basato sulla triangolazione (Jick, 1979; Eisenhardt, 1989). In una prima fase, sono stati raccolti dati secondari relativi al concorso attraverso rapporti ufficiali, video interviste, comunicati stampa e articoli accademici; in una seconda fase, sono state condotte interviste semi-strutturate. I dati primari sono stati raccolti tramite interviste semi-strutturate svolte in due fasi principali (nel 2021 e nel 2025) con inventori vincitori e finalisti di progetti di innovazione sociale nel concorso MakeToCare. Inoltre, ulteriori dati secondari sono stati ottenuti mediante siti web, notizie online, documenti ufficiali e materiali multimediali, garantendo così una solida triangolazione dei dati raccolti.

Le interviste hanno coinvolto attori chiave, come utenti guida, esperti di innovazione, organizzatori e responsabili di progetto. L'utilizzo della tecnica dello "snowball sampling" ha facilitato l'accesso a una gamma diversificata di testimonianze, arricchendo l'analisi con numerose prospettive. Per rispondere alle nostre domande di ricerca, abbiamo impiegato una metodologia qualitativa di tipo induttivo (Denzin e Lincoln, 2011; Corbin e Strauss, 2015), che ha facilitato un'esplorazione approfondita del modo in cui i facilitatori hanno svolto un ruolo attivo nei processi di innovazione, contribuendo in maniera significativa alla generazione di valore sociale. In particolare, abbiamo adottato il metodo descritto da Gioia et al. (2013) per raccogliere e analizzare i dati, prestando un'attenzione specifica al valore creato in relazione alle teorie esistenti.

Le interviste sono state registrate, trascritte e successivamente sottoposte a codifica tematica, processo che ha permesso di identificare categorie di primo ordine relative al coinvolgimento degli utenti guida, all'amplificazione delle soluzioni esistenti, alla creazione di alleanze centrate sui problemi e al rafforzamento degli ecosistemi locali. Queste categorie, individuate inizialmente, sono state poi aggregate in temi di secondo ordine mediante un processo iterativo di confronto tra i ricercatori, che ha permesso di evidenziare le dinamiche chiave emergenti.

La triangolazione dei dati, ottenuta integrando le informazioni derivanti dalle interviste con quelle provenienti dall'analisi documentale, ha assicurato la robustezza dei risultati e ha reso possibile lo sviluppo di una visione complessiva del fenomeno studiato. L'approccio adottato ha inoltre consentito di identificare i meccanismi fondamentali che favoriscono l'apprendimento condiviso e la replicabilità delle soluzioni innovative, elementi essenziali per la costruzione di un modello operativo di Open Social Innovation. In particolare, l'analisi ha evidenziato come il feedback continuo, le dinamiche di gruppo e la capacità di orchestrare le risorse in maniera efficace rappresentino fattori determinanti per il successo dei processi di co-creazione.

La fase finale dell'analisi ha previsto la sintesi dei temi di secondo ordine in dimensioni teoriche, mediante l'individuazione delle unità minime di significato alla base delle dinamiche osservate. Questo procedimento ha portato all'elaborazione di un modello che evidenzia il contributo specifico dei facilitatori e la modalità con cui essi orchestrano il flusso di conoscenze e competenze, creando condizioni favorevoli per l'innovazione sociale. La combinazione di dati primari e secondari ha consentito di identificare con precisione gli attori chiave, di chiarire i processi che supportano il potenziamento delle innovazioni e di individuare gruppi specifici da sottoporre ad ulteriori approfondimenti.

Risultati. *L'analisi dei dati ha evidenziato che i facilitatori operano attraverso quattro percorsi interconnessi, ciascuno dei quali contribuisce in maniera specifica a generare impatti sociali positivi. Questi percorsi sono: il coinvolgimento degli utenti guida, l'amplificazione delle soluzioni esistenti, la creazione di alleanze centrate sui problemi e il rafforzamento degli ecosistemi locali.*

Nel primo percorso, il coinvolgimento diretto degli utenti guida emerge come elemento fondamentale. Le testimonianze raccolte rivelano che questi soggetti, grazie alla loro conoscenza diretta delle problematiche quotidiane, forniscono un contributo essenziale all'identificazione di idee innovative. I facilitatori, organizzando workshop, incontri tematici e sessioni di brainstorming, riescono a creare spazi di dialogo in cui le esperienze personali si trasformano in soluzioni condivise. Questo approccio iterativo favorisce non solo l'identificazione di bisogni reali, ma rafforza anche il senso di appartenenza e l'empowerment all'interno della comunità, contribuendo a creare un ambiente in cui l'innovazione si nutre di input provenienti da diverse fonti.

Il secondo percorso riguarda l'amplificazione delle soluzioni esistenti. In questo ambito, i facilitatori agiscono da catalizzatori, stimolando un processo continuo di feedback e revisione che consente di perfezionare le innovazioni inizialmente sperimentali. Attraverso incontri periodici, piattaforme digitali e sessioni di revisione, le soluzioni vengono adattate alle esigenze emergenti e diffuse su scala più ampia. Tale processo è particolarmente rilevante in contesti caratterizzati da risorse limitate, dove l'agilità e la capacità di "fare di più con meno" diventano imperativi strategici. L'iterazione costante tra feedback degli stakeholder e revisione dei prototipi permette di migliorare la qualità delle soluzioni, rendendole più robuste e facilmente replicabili.

Il terzo percorso si concentra sulla creazione di alleanze centrate sui problemi. In questo caso, i facilitatori svolgono un ruolo mediatore, mettendo in relazione attori appartenenti a settori diversi - aziende, istituzioni, organizzazioni non governative e cittadini - per formare reti collaborative focalizzate sulla risoluzione di problematiche specifiche. Le alleanze così costituite permettono di integrare risorse, conoscenze e competenze, creando sinergie che favoriscono la co-creazione di soluzioni innovative. L'esperienza del concorso Make To Care ha dimostrato che la formazione di tali reti collaborative non solo migliora la capacità di rispondere alle sfide sociali, ma contribuisce anche a creare modelli replicabili che possono essere adattati ad altri contesti e territori.

Il quarto percorso riguarda il rafforzamento degli ecosistemi locali. I facilitatori operano sul territorio per connettere attori locali, favorire il trasferimento di conoscenze e condividere buone pratiche. Questo approccio permette di costruire reti locali resilienti e di creare una cultura dell'apprendimento continuo. Le soluzioni innovative sviluppate vengono adattate e replicate in contesti diversi, generando un impatto sistemico e duraturo sulla comunità. Il rafforzamento degli ecosistemi locali non solo sostiene lo scaling delle innovazioni, ma contribuisce anche a creare un ambiente favorevole alla co-creazione e al dialogo tra attori locali, favorendo l'emergere di una governance più inclusiva e partecipativa.

Le evidenze raccolte sottolineano come l'orchestrazione delle attività di facilitazione sia il fattore chiave che permette di tradurre le dinamiche di Open Social Innovation in impatti sociali concreti. In particolare, l'integrazione dei quattro percorsi operativi evidenzia la natura multidimensionale dei processi di co-creazione e il ruolo centrale dei facilitatori come mediatore e coordinatore. Le strategie adottate dai facilitatori - dalla promozione di workshop e incontri, alla gestione di feedback continui, fino alla creazione di reti collaborative - sono state in grado di favorire un apprendimento condiviso e di incrementare la capacità di scaling delle soluzioni sviluppate. I risultati, quindi, dimostrano che una gestione integrata e orchestrata dei processi innovativi, supportata da una solida rete di stakeholder, può generare impatti sociali significativi e duraturi.

Limitazioni della ricerca. *Nonostante i contributi significativi emersi dall'analisi, il presente studio presenta alcune limitazioni che offrono interessanti spunti per ulteriori ricerche. In primo luogo, il focus esclusivo sul contesto italiano, e in particolare sul caso MakeToCare, potrebbe limitare la generalizzabilità dei risultati. Le specificità culturali, istituzionali e organizzative del territorio italiano rappresentano variabili che potrebbero non replicarsi in altri contesti internazionali o in settori differenti. Ciò suggerisce la necessità di studi comparativi che possano testare la validità del modello proposto in ambienti diversi.*

Un ulteriore limite riguarda la concentrazione dell'analisi su innovazioni ben documentate e visibili, escludendo potenzialmente pratiche emergenti o soluzioni innovative non ancora riconosciute ufficialmente. Questo approccio potrebbe comportare la mancata considerazione di modelli di facilitazione che, pur essendo efficaci, non hanno ricevuto la stessa attenzione mediatica o accademica. Inoltre, l'approccio qualitativo adottato, sebbene offra una ricca interpretazione delle dinamiche, comporta una certa soggettività nelle interpretazioni dei dati. L'adozione di metodi quantitativi integrativi potrebbe contribuire a convalidare gli indicatori di impatto sociale e a verificare la replicabilità del modello in maniera più oggettiva.

Infine, il ruolo delle tecnologie digitali nel facilitare i processi di Open Social Innovation merita ulteriori approfondimenti. Sebbene il presente studio evidenzi l'importanza di strumenti digitali e piattaforme collaborative, l'analisi non ha esaminato in modo esaustivo il loro impatto quantitativo sui processi di scaling e sull'apprendimento condiviso. Ricerche future potrebbero esplorare come le tecnologie emergenti possano potenziare ulteriormente la capacità dei facilitatori di orchestrare le attività e di favorire la diffusione di soluzioni innovative.

Implicazioni manageriali. *I risultati dell'analisi offrono numerosi spunti pratici per manager, responsabili di progetto e decisori politici. In un contesto caratterizzato da sfide sociali sempre più complesse, l'adozione di strategie di Open Innovation supportate da una facilitazione efficace si configura come una leva strategica per trasformare le criticità in opportunità di sviluppo sostenibile e inclusivo.*

Una delle principali implicazioni manageriali riguarda l'importanza di investire nella formazione dei facilitatori. Queste figure devono essere dotate di competenze trasversali, che spaziano dalla gestione delle dinamiche di gruppo alla capacità di utilizzare strumenti digitali avanzati per il coordinamento delle attività. Solo attraverso una formazione mirata è possibile garantire che i facilitatori siano in grado di orchestrare processi di co-creazione efficaci, facilitando il dialogo e l'apprendimento condiviso tra gli attori coinvolti.

Un'altra implicazione riguarda lo sviluppo di sistemi di monitoraggio e valutazione degli impatti sociali. Le organizzazioni dovrebbero implementare strumenti che consentano di misurare in maniera accurata gli effetti delle iniziative di Open Social Innovation, valutando indicatori quali l'inclusione, il miglioramento della qualità della vita e la sostenibilità delle soluzioni adottate. Tali sistemi permetterebbero di orientare le strategie future e di apportare modifiche tempestive alle iniziative in corso, ottimizzando l'efficacia degli interventi.

Inoltre, l'integrazione delle tecnologie digitali si rivela essenziale per facilitare la comunicazione tra i vari stakeholder e per garantire un flusso costante di informazioni e feedback. Le piattaforme collaborative, i social network e le applicazioni per la gestione dei progetti possono contribuire in modo significativo a rafforzare le reti locali e a favorire lo scaling delle soluzioni innovative. Investire in infrastrutture tecnologiche e in programmi di formazione specifici diventa quindi fondamentale per consolidare i processi di co-creazione.

Infine, la promozione di collaborazioni intersettoriali, che coinvolgano settore pubblico, privato e terzo settore, costituisce un elemento chiave per la gestione delle sfide sociali. L'esperienza del concorso Make To Care evidenzia come la creazione di alleanze tra attori diversi, mediate da facilitatori esperti, possa amplificare l'impatto delle innovazioni, favorendo lo scambio di risorse e competenze e creando una rete di supporto capace di rispondere in maniera coordinata alle problematiche sociali. Tale modello di collaborazione integrata offre spunti preziosi per la definizione di politiche pubbliche orientate al bene comune e per l'adozione di strategie di Open Innovation che mettano al centro il contributo di ogni stakeholder.

Originalità della ricerca. *L'originalità del presente lavoro risiede nell'approfondimento sistematico e integrato del ruolo dei facilitatori negli ecosistemi di Open Social Innovation, una dimensione che fino ad oggi è stata trattata in maniera superficiale nella letteratura. Il modello proposto integra prospettive teoriche classiche, che hanno evidenziato l'importanza dei flussi conoscitivi e della collaborazione esterna, con evidenze empiriche raccolte sul campo, offrendo una visione multidimensionale e operativa delle dinamiche di facilitazione.*

Il focus sui facilitatori come agenti di cambiamento - capaci di orchestrare l'azione collettiva e di favorire l'apprendimento condiviso - amplia il tradizionale concetto di leadership, spostando l'attenzione dalla mera gestione delle risorse alla capacità di connettere e integrare competenze e conoscenze eterogenee. Questo approccio innovativo, supportato dai dati raccolti, fornisce strumenti utili sia per la teoria che per la prassi manageriale, offrendo un modello replicabile che possa essere applicato in diversi contesti per affrontare sfide sociali complesse.

Inoltre, l'adozione di un approccio longitudinale ha permesso di monitorare l'evoluzione delle strategie di facilitazione nel tempo, evidenziando i meccanismi chiave - quali il feedback continuo e il processo di scaling - che favoriscono la replicabilità delle soluzioni innovative. L'integrazione di tali elementi in un modello operativo rappresenta un contributo significativo al dibattito accademico e offre una base empirica solida per la progettazione di interventi e politiche mirate all'innovazione sociale. La capacità di coniugare la teoria con la pratica, offrendo strumenti operativi per la gestione degli ecosistemi, rende questo lavoro particolarmente rilevante per manager, responsabili di progetto e decisori politici.

Parole chiave: *Open Social Innovation; facilitatori; fragilità; co-creazione; ecosistema; analisi qualitativa;*

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Track 8
Retailing & Service Management

Disclosing the AI Identity: How Virtual Assistant Transparency Shapes Consumer Perceptions and Purchase Behavior

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Abstract

Artificial intelligence (AI) is transforming consumer-brand interactions, particularly in e-commerce, where AI-powered virtual assistants play a central role in customer engagement. A key challenge in AI-driven service interactions is AI transparency - the explicit disclosure of an AI's non-human nature - which can influence consumer trust, perceived quality, and purchase behavior. While previous research has broadly examined AI acceptance, this study provides a focused empirical analysis of how AI transparency shapes consumer perceptions and decision-making processes. Using structural equation modeling (SEM) with validated theoretical constructs, this research examines how AI transparency influences trust in the retailer, perceived quality, ease of use, customer inspiration, and purchase intention. The findings indicate that AI transparency exerts a positive influence on consumer trust in retailers and perceived quality, thereby shaping consumers' attitudes toward AI-driven interactions. However, satisfaction with the AI service agent does not directly influence purchase intention, suggesting that other factors, such as customer inspiration, play a more significant role in driving consumer behavior. Additionally, while privacy concerns and risk perception were included as boundary conditions, they were not found to have statistically significant effects on key consumer outcomes. From a managerial perspective, these insights underscore the necessity for companies to adopt a balanced AI transparency strategy, ensuring clarity while addressing potential concerns about automation and privacy. This study contributes to the growing body of literature on AI ethics and consumer psychology, offering both theoretical advancements and practical guidance for businesses seeking to integrate AI-powered virtual assistants while maintaining high levels of consumer trust and engagement.

Framing of the research. *The advent of artificial intelligence (AI) in marketing has prompted a paradigm shift in consumer-brand interactions, with the processing of a great amount of data occurring in real time. AI-powered virtual assistants, chatbots, and recommendation systems have profoundly influenced the way in which businesses engage with customers, playing a pivotal role in enhancing personalization and efficiency. For instance, conversational shopping has emerged as a paradigm through which AI-enabled technologies, such as chatbots, virtual assistants, and voice assistants, serve as digital intermediaries between consumers and businesses. The employment of conversational interfaces, including chatbots and voice assistants, has enabled businesses to respond to consumer queries in a more timely and customized manner, thereby fostering a dynamic and engaging interaction experience. (Wang et al., 2020). These technologies have been observed to be more effective than conventional methods, particularly when they offer an automated alternative to non-interactive scenarios (Puntoni et al., 2021). However, these advancements have also introduced new challenges, particularly in terms of consumer trust, privacy concerns, ethics, and perceived risk. The degree of consumer trust in AI-driven services varies considerably, and their impact on consumer behavior, privacy concerns, and perceived quality remains a subject of debate. While some consumers value the efficiency and tailored experiences offered by AI-driven services, others are skeptical due to concerns over transparency, privacy, and trustworthiness, particularly in a context where consumers are increasingly aware of the value of their personal data (Chen et al., 2022).While AI represents a cutting-edge technological innovation that facilitates daily life and "makes everything run more smoothly", it also brings potential threats and possible negative effects on a personal, social, and cultural levels.*

A review of the extant literature on AI in marketing reveals both opportunities and challenges. On the one hand, AI enables firms to analyze vast amounts of data, improving customer segmentation and enabling real-time personalized interactions (Manyika, 2011). On the other hand, its application in marketing requires careful consideration of transparency and ethical implications. A growing body of research has demonstrated that the implementation of AI-

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driven personalization strategies can effectively enhance customer experience and promote enhanced customer engagement with the appropriate adoption of transparent communication strategies and adherence to ethical principles (Gao & Liu, 2023). The advent of AI technology has made it significantly more feasible for marketers to obtain large volumes of consumer data, as well as diverse types of data, efficiently. Machines can now receive visual, audio, or linguistic input directly without human intervention and promptly process it (Chen et al., 2022). While companies have employed AI in various capacities, academic research appears to be lagging in its examination of consumer perceptions of benefits and concerns. A limited number of studies have examined consumers' perceptions of and receptivity to AI-driven marketing activities, including personalized advertisements, recommendations, chatbots, and virtual assistants (Chen et al., 2022). Nevertheless, consumers' perceptions have been identified as a pivotal factor in determining the efficacy of AI applications. They play a crucial role in enhancing the effectiveness of AI-driven marketing activities by providing valuable insights, informing strategic design, and developing more effective engagement methods (Chen et al., 2022).

In particular, the field of AI has demonstrated a notable capacity to enhance marketing endeavors. This enhancement is achieved through the acquisition of insights from online word-of-mouth or sentiment analysis, the modeling of interactive marketing responses, the prediction of churn (i.e., customer abandonment), and the automatic adaptation of websites, advertisements, and pricing to better align with customers' personalization preferences. These applications aspire to provide a customized experience for both potential and existing customers, thereby fostering an intimate relationship with consumers. According to Flavián et al. (2024), companies and service providers are introducing AI applications, AI-driven robotics, and other automation technologies to increase productivity and offer consumers improved experiences and options. Companies such as Amazon rely extensively on AI algorithms to develop personalized offerings, use robots to prepare shipments, and machine learning to coordinate deliveries, achieving higher levels of efficiency than purely human-based companies. In 2022, global sales of professional service robots experienced a 48 percent surge (Flavián et al., 2024). Experts predict that certain sectors, such as financial services, will be fully automated by 2030. In such a scenario, the economic impact of AI on national GDP could be approximately 20 percent in countries such as China and the US (Flavián et al., 2024). While automation is expected to enhance consumer experiences and quality of life by increasing efficiency, the technological impact on users' psychological well-being frequently exhibits an opposing effect (Flavián et al., 2024). This phenomenon can be attributed to user acceptance of technology, perceptions, and purchasing and consumption behaviors.

A growing body of research has examined consumer trust in AI. Bandura's (2001) social cognitive theory emphasizes the role of transparency in reducing uncertainty and fostering trust. However, other scholars argue that excessive AI transparency can heighten consumer concerns about data security and decision-making biases (Lemon & Verhoef, 2016). The role of AI in consumer decision-making is further elaborated by Puntoni et al. (2021), who highlight the importance of perceived competence and ethical AI practices. Consumer responses to AI are also shaped by psychological factors, including perceived anthropomorphism and control (Chintalapati & Pandey, 2022). Research has shown that enhancing transparency in AI can foster consumer trust when coupled with robust data protection policies and effective communication strategies (Darke et al., 2016). While prior studies have examined consumer adoption of AI, there is a notable lack in understanding how transparency in AI-driven interactions affects key consumer attitudes and behaviors. A pivotal component of AI-driven customer service is AI transparency, defined as the extent to which consumers are cognizant of their interaction with an AI system as opposed to a human agent. In this study, AI transparency is specifically operationalized as a virtual assistant that explicitly discloses its AI nature at the inception of the interaction. This transparency may influence consumer perceptions in a positive way by enhancing trust and reducing uncertainty (Gao & Liu, 2023) or in a negative way by triggering concerns about data security and the reliability of decision-making (Chintalapati & Pandey, 2022).

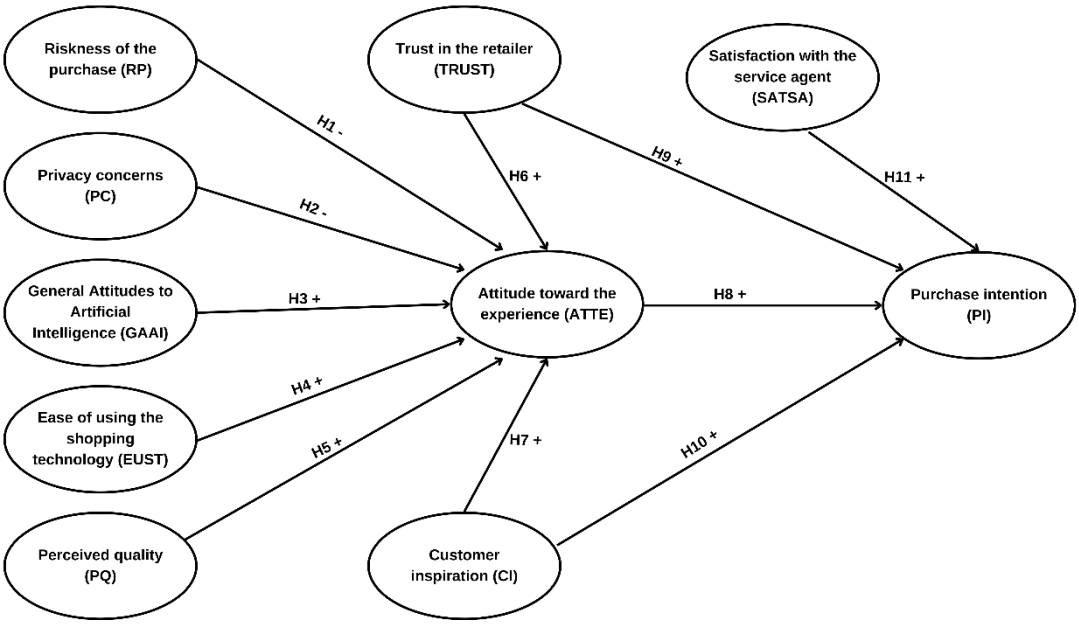
In light of the divergent perspectives that currently exist on the subject and building upon the foundational work established by previous literature examining AI-mediated marketing interactions and consumer attitudes, the present study aims to address the existing gap in knowledge regarding the impact of AI transparency on key consumer perception factors. These factors include, but are not limited to, perceived quality, trust in retailers, satisfaction with AI-assisted service agents, and ultimately purchase intention. To this end, the study employs structural equation modeling (SEM) to provide empirical evidence on the effects of AI transparency on consumer decision-making.

Purpose of the paper. *The primary objective of this research is to investigate how consumers respond to AI-powered service agents when their AI identity is explicitly disclosed. In this study, AI transparency is specifically operationalized as a virtual assistant that explicitly discloses its AI nature at the beginning of the interaction. This study investigates how AI transparency influences consumer perceptions and behavior in e-commerce environments, particularly when interacting with AI-powered virtual assistants. The study will examine whether disclosing an AI service agent's identity fosters consumer trust or, conversely, leads to skepticism and concerns over privacy and perceived risk. Specifically, we propose a conceptual model (Figure 1), based on established theories in consumer behavior and AI adoption, structured around the relationships among the following factors:*

- *General attitude toward artificial intelligence (GAAI): defined as consumers' perceptions of AI in general, and it is a significant predictor of technology acceptance and effectiveness of interaction with a virtual assistant. As posited by Schepman and Rodway (2020), a positive attitude toward AI can facilitate the adoption of innovative technologies, while a negative attitude can generate resistance.*

- *Attitude toward experience (ATTE): it is a key variable for measuring how consumers subjectively evaluate the quality of their interaction with the service. This variable could be influenced by multiple factors, such as the simplicity of the procedure, perceived efficiency, and the reliability of the assistance received. The extant literature suggests that a positive attitude toward a shopping experience can positively influence the propensity to repeat the experience and build brand loyalty (Chun et al., 2017).*
- *Ease of using the shopping technology (EUST): it is a pivotal variable in assessing how intuitive and user-friendly consumers perceive technology to be. Inman & Nikolova (2017) emphasize that ease of use can influence consumers' adoption and use of technology. Consumers' perceptions of technology could vary depending on their prior experience with AI and the transparency of its presence. Technology perceived as too complex could reduce the effectiveness of interaction and discourage future use.*
- *Privacy Concerns (PC): it represents a significant factor in the adoption of AI-based technologies. As the use of chatbots and virtual assistants increases, consumers are becoming increasingly aware of the implications in terms of protecting personal data (Martin et al., 2017). Recent studies highlight how consumers are often concerned about control and transparency over the use of their personal information. In the context of this research, it is plausible that individuals aware of their interaction with a virtual assistant may demonstrate higher levels of concern compared to those lacking this awareness, adversely impacting their perception of the service.*
- *Riskiness of the Purchase (RP): The perception of risk constitutes a pivotal component in the realm of purchase behavior, particularly within digital environments. Consumers may regard interaction with a virtual assistant as less secure, particularly in situations where they are not explicitly informed about the origin of the responses they receive (Campbell et al., 2001). A disclosed virtual assistant could mitigate this risk, as consumers would be aware of the identity of the service provider.*
- *Satisfaction with the service agent (SATSA): it reflects the consumer's level of appreciation for the service received. The extant literature indicates that high satisfaction with the service can result in increased brand loyalty and a greater propensity for purchase intention (Wan et al., 2016). In the context of this research, the explicit identification of the assistant as "virtual" could influence the perception of competence and service quality, determining the final satisfaction level.*
- *Perceived quality (PQ): it refers to the comprehensive assessment by the consumer of the degree to which the service's characteristics align with their expectations, with the possibility that the service will exceed these expectations. In the context of a virtual assistant-mediated shopping experience, factors such as the responsiveness speed, the precision of the information provided, and the platform's navigability can influence this perception (Faruk et al., 2018).*
- *Trust in the retailer (TRUST): it is a critical factor in motivating purchases, as it mitigates psychological impediments associated with the security of online transactions (Darke et al., 2016). Trust is cultivated through transparency, reliability, and the perceived quality of service (Tax et al., 1998). The utilization of a virtual assistant has the potential to influence this trust in various ways.*
- *Customer Inspiration (CI): it refers to the capacity of an interaction to evoke desires or motivations that facilitate purchase decisions. A consumer can be inspired by an interaction that is fluid, personalized, and perceived as innovative. As Böttger et al. (2017) have noted, a technology's capacity to inspire consumers is closely related to its perceived relevance and ability to provide added value. If AI is perceived as a useful tool that is seamlessly integrated into the interaction, consumers may experience heightened motivation to make a purchase.*
- *Purchase intention (PI): it is a critical component in comprehending consumer behavior, as it pertains to the probability of a consumer proceeding with a purchase after their interaction with a service. The marketing literature demonstrates that this intention is influenced by numerous factors, including perceived quality, service experience, and the trust placed in the brand or retailer (Dhruv et al., 1998).*

Fig. 1: Conceptual model



Source: Authors' elaboration.

Methodology. *This study employs a quantitative research approach using survey data collected from 250 respondents. The structured questionnaire was distributed in September 2024 via social media platforms (Facebook, Instagram), ensuring broad accessibility to potential respondents. The rationale for selecting an online sample aligns with previous research, which has demonstrated that online respondents tend to be more familiar with AI-based interactions, making them a more relevant population for examining AI transparency effects in marketing contexts (Aiolfi et al., 2022). The sample is characterized by a balanced gender distribution, with 48% of respondents identifying as male and 52% as female. A significant proportion of the sample is comprised of younger individuals, with 44% falling within the 16-25 age bracket. In terms of education, most respondents have obtained a high school diploma (46%) or a university degree (45%). With respect to AI interaction, 38% of respondents reported frequent engagement with AI-based systems within the last year, while 42% indicated limited usage, having employed them only a few times. Furthermore, 32% frequently interacted with virtual assistants via chat, with an additional 50% engaging on an occasional basis. These observations suggest that the sample is digitally engaged and familiar with AI-driven technologies, rendering it well-suited for examining perceptions of AI transparency.*

Prior to responding to the survey, participants were exposed to a visual stimulus (see Figure 2) depicting a conversation in which the virtual assistant transparently identifies itself using the label "Marco, virtual assistant". This introduction was designed to reinforce AI transparency.

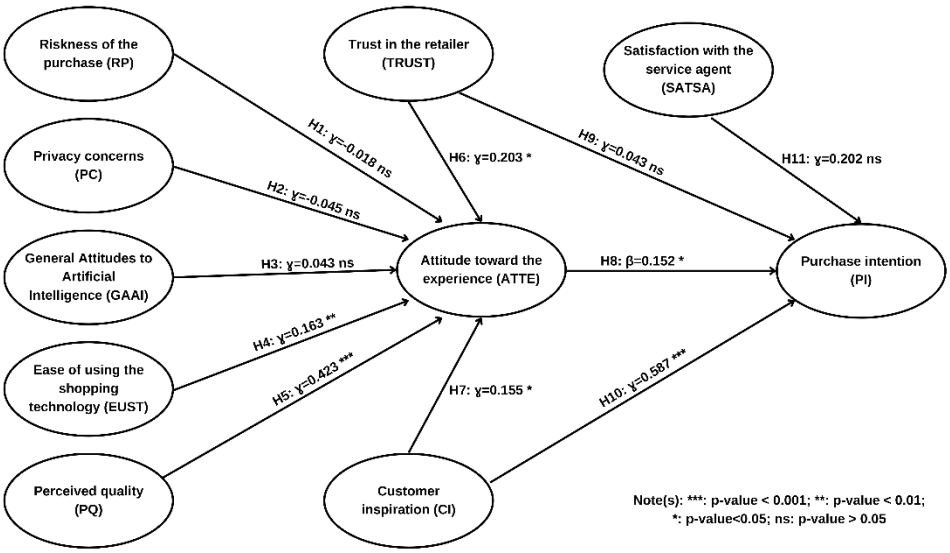
Fig. 2: Visual stimulus of AI transparency

Source: Authors' elaboration

After the presentation of the stimuli, the subjects completed survey items that measured the model variables. These survey items employed constructs and validated scales from prior literature (see Appendix A) that were prior translated into Italian and adapted to the context of the research. In addition to the measures discussed above, demographic questions were included. As far as the analytic procedures, the measurement 1-7 Likert scales were adapted from previous studies and validated through confirmatory factor analysis (CFA) to ensure reliability and construct validity (Beatty & Ferrell, 1998). Cronbach's alpha (Santos, 1999) was utilized to assess reliability, with all values exceeding the 0.70 threshold (see Appendix A). Convergent validity was substantiated by examining factor loadings (Anderson & Gerbing, 1988) and composite reliability, both of which satisfied the recommended cut-off values. Discriminant validity was assessed using the Fornell and Larcker (1981) criterion, ensuring that the average variance extracted (AVE) exceeded the squared correlations between constructs. The measurement model, which assesses relationships among the key variables of consumer perception analysis in the context of AI transparency, was tested prior to structural model analysis, following the recommendations of Anderson and Gerbing (1988) and Sethi and King (1994).

Results. *The model fit, tested with LISREL 8.80, was assessed through key indices, resulting in a good fit with satisfactory results indicating the robustness of the model: $\chi^2 = 69.456$, df = 6, p = 0.000, RMSEA = 0.206 (90% CI: 0.164 - 0.251), CFI = 0.982, NFI = 0.980, NNFI = 0.861, SRMR = 0.0177. These indices suggest that the model provides an adequate representation of the data, with the comparative fit index (CFI) and normed fit index (NFI) exceeding the recommended threshold of 0.90, and a low standardized root mean square residual (SRMR), supporting a well-fitting model.*

Fig. 3: SEM model



Source: Authors' elaboration.

The results of the path analysis are shown in Figure 3. As shown, riskiness of the purchase (H1: $\gamma = 0.018$, $p > 0.05$), privacy concerns (H2: $\gamma = 0.045$, $p > 0.05$) and general attitude toward artificial intelligence (H3: $\gamma = 0.043$, $p > 0.05$) do not significantly influence attitude toward the experience, suggesting that these concerns and general attitudes may not be primary determinants of how consumers perceive their interactions. Conversely, the ease of using shopping technology (H4: $\gamma = 0.163$, $p < 0.01$) positively affects attitude toward the experience, supporting the idea that a more intuitive and user-friendly shopping technology fosters a more favorable perception of the service. Additionally, perceived quality (H5: $\gamma = 0.423$, $p < 0.001$) emerges as a strong predictor of the attitudes towards the experience, highlighting that higher perceived service quality enhances consumers' motivation and engagement with the shopping experience.

Trust in the retailer (H6: $\gamma = 0.203$, $p < 0.05$) is significantly and positively associated with attitude toward the experience, suggesting that consumers who trust the retailer are more likely to perceive their shopping experience positively. However, this factor does not directly impact purchase intention (H9: $\gamma = 0.043$, $p < 0.05$) indicating that while it contributes to attitude formation, it does not directly translate into purchasing behavior. Similarly, satisfaction with the service agent does not significantly predict purchase intention (H11: $\gamma = 0.202$, $p > 0.05$).

Customer inspiration (H7: $\gamma = 0.155$, $p < 0.05$) significantly impacts attitude toward the experience, indicating that when consumers feel inspired by the interaction, they evaluate their experience more favorably. It also significantly predicts purchase intention (H10: $\beta = 0.587$, $p < 0.001$), meaning that when consumers feel inspired by their shopping experience, they are much more likely to make a purchase. Finally, attitude toward the experience (H8: $\beta = 0.152$, $p < 0.05$) has a positive effect on purchase intention, demonstrating that consumers with a positive perception of their experience with the AI-virtual assistant are more likely to proceed with a purchase. Table 1 summarizes the SEM's results.

Tab. 1: Summary Structural Model

Hypothesis	Coeff.	P-value	Hypothesis
H1: Riskiness of the purchase → Attitudes towards the experience	-0.018	> 0.05	Rejected
H2: Privacy concerns → Attitudes towards the experience	-0.045	> 0.05	Rejected
H3: General attitudes to Artificial Intelligence → Attitudes towards the experience	0.043	> 0.05	Rejected
H4: Ease of using the shopping technology → Attitudes towards the experience	0.163	< 0.01	Accepted
H5: Perceived quality → Attitudes towards the experience	0.423	< 0.001	Accepted
H6: Trust in the retailer → Attitudes towards the experience	0.203	< 0.05	Accepted
H7: Customer inspiration → Attitudes towards the experience	0.155	< 0.05	Accepted
H8: Attitudes towards the experience → Purchase intention	0.152	< 0.05	Accepted
H9: Trust in the retailer → Purchase intention	0.043	> 0.05	Rejected
H10: Customer inspiration → Purchase intention	0.587	<0.001	Accepted
H11: Satisfaction with the service agent → Purchase intention	0.202	> 0.05	Rejected

Source: Authors' elaboration.

To conclude, the findings highlight that ease of use, perceived quality and consumer inspiration play a crucial role in shaping a positive attitude and acts as determinants of attitudes, emphasizing the importance of intuitive and reliable platforms. The attitude toward experience and customer inspiration are key drivers of purchase intention. Interestingly, while trust in the retailer enhances attitude toward the experience, it does not directly influence purchase intention, suggesting that trust alone is not enough to drive sales.

Research limitations. *Despite the valuable insights it provides, this study is not without its limitations. First, the sample consists exclusively of Italian consumers, which may restrict the generalizability of the findings across different cultural contexts. Future research should replicate this study in other geographical settings to account for potential cultural differences in AI acceptance and consumer behavior. Second, the study focuses on AI-driven customer service interactions within an e-commerce context. While this sector is particularly relevant for AI adoption, it does not fully capture the breadth of AI applications in other domains, such as healthcare, financial services, or public administration, where consumer expectations and trust mechanisms may differ. Third, the data were collected through an online survey distributed via social media platforms. While this method ensures access to a digitally engaged audience, it may introduce selection bias, limiting the representation of consumers who are less active online or have lower familiarity with AI technology. In light of these limitations, future studies should consider employing mixed-method approaches, incorporating both experimental designs and qualitative studies, or conducting offline surveys to enhance external validity.*

Managerial implications. *From a management perspective, the research highlights the need for companies to carefully balance AI transparency with user reassurance strategies. The findings suggest that while AI disclosure can foster trust and improve the perceived quality of customer interactions, it can also raise concerns about privacy and data security. Companies and retailers implementing AI-powered customer service should therefore develop communication strategies that emphasize both transparency and consumer protection, ensuring that AI adoption is aligned with ethical and regulatory standards.*

Transparency in AI interactions emerges as a key driver of consumer trust, satisfaction, and purchase intention. Companies should consider AI transparency not only as an ethical practice, but also as a strategic tool to enhance perceived service quality and build consumer trust. Retailers should clearly disclose the AI nature of virtual assistants, as transparency improves perceived service quality and fosters trust, which contributes to a more positive attitude toward the experience but does not directly increase purchase intention. Therefore, trust should be leveraged to improve experiential factors that, in turn, drive purchases. However, excessive transparency may raise privacy concerns among certain consumer segments, requiring a balanced communication strategy that reassures users about data security with privacy regulations (e.g., GDPR, CCPA) and offers users control over their data sharing preferences to reduce skepticism and promote engagement while maintaining an efficient AI-driven service. Therefore, companies should ensure that AI systems clearly communicate their nature while maintaining an intuitive and seamless interaction experience. In this context, customer inspiration is a key driver of consumer attitudes and behaviors, influencing both attitude toward the experience and purchase intention. While privacy concerns and ease of use shape perceptions of AI-assisted interactions, inspiration itself is not directly affected by these factors but plays a mediating role in the decision-making process.

Although privacy concerns may initially appear to be a barrier, this study shows that they were not statistically significant in the tested model. However, effective privacy management remains important to reduce perceived risk and foster trust, especially in sensitive sectors or with privacy-conscious consumers. This reinforces the importance of transparent and responsible AI practices. Because customer inspiration effects purchase intention, retailers should design AI interactions that go beyond basic transactional tasks and encourage AI transparency. Implementing AI-driven recommendations, personalized product suggestions, and proactive engagement strategies can increase customer inspiration and drive purchase behavior. For example, retailers should use AI-powered virtual assistants to create engaging and interactive shopping experiences, such as AI-curated shopping lists, voice-activated product explorations, and immersive digital showrooms that drive discovery and conversion.

In addition, the research underscores the critical role of retailer trust in shaping consumer perceptions with AI-powered interactions. However, our findings indicate that trust in the retailer does not directly influence purchase

intention. Instead, trust contributes to a positive attitude toward the AI-assisted experience, which in turn affects customer inspiration and purchasing behavior. Companies need to complement AI transparency with high service quality and reliability, as trust remains a fundamental element of AI-enabled consumer experiences.

When managed effectively, AI transparency can enhance the perceived quality and satisfaction with the AI service agent. However, satisfaction with the AI agent was not found to have a significant effect on purchase intention. This suggests that while enhancing AI responsiveness, accuracy, and personalization can improve the user experience, other factors play a more decisive role in shaping purchasing behavior, such as trust in the retailer or ease of use. Consequently, retailers are advised to prioritize AI design strategies that not only enhance user satisfaction but also fortify the broader consumer decision-making process.

While AI-powered customer service can streamline interactions and reduce costs, some consumers still prefer human involvement in complex purchasing decisions. Retailers should implement seamless AI-to-human transitions and ensure that customers can easily escalate questions to a human representative when needed. A strong reputation, coupled with transparent AI communications, will ensure that consumers feel secure in their interactions and foster long-term loyalty.

In summary, retailers embracing AI must balance transparency, personalization, and privacy considerations to optimize consumer trust and engagement. A well-executed AI strategy can enhance customer experience, build long-term loyalty, and drive revenue growth in an increasing digital retail landscape.

Originality of the paper. *This study makes a significant contribution to the expanding corpus of research on AI in marketing by empirically examining the effects of AI transparency in consumer interactions. Whereas prior studies have primarily explored AI adoption and consumer trust in broad terms, this research provides a more focused and contextualized analysis of how explicit AI disclosure influences key psychological and behavioral outcomes across the customer journey. A distinguishing aspect of this study is its focus on a specific AI-driven customer interaction scenario, in which an AI-powered virtual assistant clearly identifies itself as a non-human entity. The analysis of consumer responses to this disclosure provides a nuanced understanding of how AI transparency shapes consumer attitudes and decision-making processes, extending prior research by demonstrating that AI transparency influences not only trust and perceived quality, but also a potential driver of customer inspiration and engagement, which in turn drive purchase intention. Furthermore, this study integrates privacy concerns and risk perception as boundary conditions. Although these variables were not found to be statistically significant in the final model, their inclusion highlights the contextual complexity of AI-enabled experiences and invites future research to examine these factors across different consumer segments or sectors. This comprehensive approach offers significant contributions to the field, providing both theoretical advancements in AI ethics and practical implications for businesses. Finally, by integrating structural equation modeling (SEM) with validated theoretical constructs, this study provides a robust empirical framework that advances current understanding of how transparency in AI interactions can serve as both a strategic tool and an ethical imperative for businesses aiming to maintain consumer trust while innovating through automation.*

Key words: *Artificial Intelligence (AI); virtual assistant; AI transparency; Structural Equation Modeling (SEM); Human-AI Interaction; Purchase Intention*

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Appendix A

Scales summary

Variable	Items	Cronbach's alpha	Mean
Attitude toward the experience (ATTE) *adapted from Chun et al. (2017)*	**ATTE1:** How much did you like the service provided by the AI virtual assistant? Disliked it very much / Liked it very much **ATTE2**: How enjoyable was the experience of the service provided by the AI virtual assistant? Not at all enjoyable / Very enjoyable **ATTE3**: How fun was the experience of the service provided by the AI virtual assistant? Not at all fun / Very fun **ATTE4**: How good was the experience of the service provided by the AI virtual assistant? Not at all good / Very Good	.917	3.929
Perceived quality (PQ) *adapted from Faruk et al. (2018)*	**PQ1**: This service provided by the AI virtual assistant is of high quality. **PQ2**: This service provided by the AI virtual assistant is a superior service. **PQ3**: This service provided by the AI virtual assistant is of very good quality.	.889	3.919
Customer inspiration (CI) *adapted from Böttger et al. (2017)*	**CI1:** I was inspired to buy something. **CI2:** I felt a desire to buy something. **CI3:** My interest to buy something was increased. **CI4:** I was motivated to buy something. **CI5:** I felt an urge to buy something.	.939	3.574
Purchase intention (PI) *adapted from Dhruv et al. (1998)*	**PI1**: I would purchase the product. **PI2**: I would consider purchasing this product with a 10% discount. **PI3**: There is a good chance that I would consider purchasing this product.	.890	3.777
Ease of using the shopping technology (EUST) *adapted from Inman & Nikolova (2017)*	**EUST1**: I believe that my interaction with this technology will be clear and understandable. **EUST2**: It will be easy for me to become skillful in using this technology. **EUST3**: I would find this technology easy to shop online.	.922	.221
Privacy concerns (PC) *adapted from Martin et al. (2018)*	**PC1:** I believe I have control over what happens to my personal information. **PC2:** It is up to me how much the company uses my information. **PC3:** I have a say in how my information is used by the company. **PC4:** I have a say in whether my personal information is shared with others.	.914	3.187
Riskness of the purchase (RP) *adapted from Campbell et al. (2001)*	**RP1**: Buying a product through this chat would be risky. (R) **RP2:** There is a good chance that a problem will arise if you purchase a product via chat **RP3:** I would be worried that I would be disappointed if I bought the product from this chat. (R) Note: the items marked with R have been reversed	.909	3.287
Satisfaction with the service agent (SATSA) *adapted from Wan et al. (2016)*	**SATSA1**: The service provided by this AI virtual assistant is good. **SATSA2**: The service provided by this AI virtual assistant is better than I expected. **SATSA3**: I am happy with the service provided by this AI virtual assistant.	.921	3.908
Trust in the retailer (TRUST) *adapted from Tax et al. (1998) and Darke et al. (2016)*	**TRUST1:** I believe that I could trust this retailer. **TRUST2:** I could depend on this retailer. **TRUST3:** I think this retailer would be reliable in meeting its promises. **TRUST4:** This retailer probably has high integrity.	.950	3.816
General Attitudes to Artificial Intelligence (GAAI) *adapted from Schepman & Rodway (2020)*	**GAAI1:** There are many beneficial applications of AI. **GAAI2:** I am impressed by what AI can do. **GAAI3:** AI can have positive impacts on people's wellbeing. **GAAI4:** Artificial Intelligence is exciting. **GAAI5:** AI can provide new economic opportunities for this country. **GAAI6:** AI systems can perform better than humans. **GAAI7:** Much of society will benefit from a future full of AI. **GAAI8:** I am interested in using AI systems in my daily life. **GAAI9:** An AI agent would be better than an employee in many routine jobs.	.908	3.584

Source: Authors' elaboration

Socio-Demographic Clustering and Localized Competition: A Spatial Analysis of Grocery Retail Markets in France

MICHELE BADOLATO[1]

Abstract

This paper investigates the role of socio-demographic clustering in shaping grocery retail performance in France. We use IRIS data to segment consumers into 12 clusters and build a turnover allocation model with a distance decay function. The results show that the market shares, competition intensity, and store performance in each cluster vary greatly across them, stressing the importance of matching the store type of offer with the preferences of the surrounding consumers. Findings offer actionable insights for optimizing store locations and formats in competitive markets

Target Journals: *Journal of Retailing and Consumer Services; Journal of Retailing*

Framing of the research. *The grocery retail market is highly concentrated and strongly competitive, with store performance significantly influenced by geographic layout and surrounding consumer demographics. This is particularly evident in France, where the top eight grocery retailers account for 98% of the total market share, and the national CR4 has increased from 66.5% to 75% between 2018 and 2024. These market dynamics, coupled with regulatory barriers, are crucial for policymakers aiming to safeguard consumer interests through merger regulations and retailer market power oversight (Turolla, 2010; Allain et al., 2017). Additionally, they present challenges for both established competitors and new entrants seeking to expand their presence.*

While national competition is important, retail competition is primarily localized, centered around the concept of retail catchment areas-geographical zones from which stores or shopping centers draw the majority of their customers, typically measured by walking distance or driving time (Dolega et al., 2016).

The theoretical basis for this study lies in the frameworks of spatial competition and retail catchment concepts, which are significant areas of interest for both scholars and practitioners, and they have been explored extensively in the literature, tracing back nearly a century to the foundational works of William J. Reilly (1929, 1932), who applied spatial interaction theory to retail markets (Brown, 1993). The characteristics of the catchment area are primarily shaped by three factors: demand, supply, and consumer interaction. The demand side is dictated by population size and distance, regarded as the determinants of a catchment area's retail sales. In contrast, the characteristics of a store, so its attractiveness, significantly influence its catchment area on the supply side. The share of customers a retail outlet attracts from a region is represented by the entropy-maximising model, which is inversely proportional to the distance and directly proportional to the outlet's attractiveness (Birkin et al., 2010). While demographic factors like population size and household incomes within catchment areas significantly influence shoppers' behaviour and retail performance (Kuruvilla and Joshi, 2010), the extent to which malls can attract customers largely depends on their size and positioning strategy. In few words, larger (and well positioned) the store, higher is its attractiveness, and wider is expected to be its catchment area. Furthermore, subsequent research has expanded on these theories, incorporating models focused on demand-side factors (Birkin et al., 2010), uncertainty in catchment areas (Rasouli and Timmermans, 2013), retail agglomeration dynamics on a national scale (Dolega et al., 2016), and more recently, catchment analysis has been refined to account for purchasing power variations (Yim Yiu et al., 2024) or it has been redefined using mobile data (Guan et al., 2025).

Despite the growing interest of academic researchers, few works on catchment area have been made on grocery industry specifically, which, in the sphere of retailers, is the one most susceptible to the distance customer-to-store. In the paper of Allain et. al (2017) on grocery market mergers in France, the researchers assumed that, on average, consumers are willing to drive up to 30 minutes to reach a hypermarket, while they drive 10 to 15 minutes to reach a supermarket or a discount store. While these distances are a rule of thumbs in the industry, they tend to ignore the real effect of distance inside the catchment area, considering a consumer really close to the store as attracted as one that lives almost 30 minutes far away from it. In addition, a hypermarket of many thousands of square meters should have a higher catchment area that one large just a thousand square meters. In our research, we tried to implement a simple, yet more sensible, model of retail catchment depending on a decay function, which captures the decline in store attractiveness (based on size and store type) with increasing distance.

The other pillar of our research is based on customer segmentation, a cornerstone for retail planning, enabling firms to tailor their strategies based on the heterogeneity of consumer preferences. Geodemographic segmentation has been

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studied intensively in marketing (Gonzalez-Benito & Gonzalez-Benito, 2004; 2005; Carpenter & Moore, 2006), since it offers a valuable framework for capturing spatial market heterogeneity, identifying behavioural patterns such store formats and attributes preferences. Ultimately, methods like k-means clustering have been use for intelligent customers segmentation, providing actionable insights into customer behaviour (Tabianan et al., 2022). Finally, research examining the interaction between socio-economic characteristics and grocery store performance remains limited, with few exceptions. Addressing this gap, our study investigates how localized socio-economic clustering influences store performance and market share

Purpose of the paper. *This study bridges two key areas of research - socio-demographic clustering and spatial competition modelling - to propose a novel approach to evaluating store performance at a neighbourhood level. Specifically, we investigate how socio-economic clustering at the IRIS level (the smallest statistical geographic units in France) serves as a proxy for consumer behaviours that shape local grocery market dynamics. At the same time, we apply a turnover allocation model based on a decay function inspired by the Huff Model, incorporating both store attractiveness and distance between the store and IRIS units. This dual approach enables a more comprehensive analysis of grocery retail competition and the interaction between different consumer clusters and store formats.*

To address these research gaps, we formulate the following questions:

1. *What is the grocery market structured in terms of concentration and competition at a micro-local level in the south of France?*
2. *Do geodemographic clusters influence the performance of different grocery retail formats?*

First, using a two-step clustering approach, we segment IRIS units (the smallest statistical geographic units in France) into 12 distinct socio-economic clusters, capturing latent heterogeneity in consumer attributes at a fine scale.

Then, we estimated the retail catchment area and the turnover made by each store in each IRIS. Retail catchment modelling has historically been centred around consumer-based approaches, with one of the most well-known being the Huff Model (Huff, 1964). The Huff Model estimates the probability of a consumer at location i choosing a retail centre j based on store attractiveness and distance decay. In these last decades, the model evolved under vary aspects. For example, it has been showed that the decay of patronage linked with duration of travel can be adjusted by assigning a power value to the β parameter, with larger values representing a more rapid decay (Joseph and Kuby, 2011). A substantial body of literature has evaluated various aspects of the distance decay parameter and estimation of its values, often through survey or study of transaction data (e.g. Huff, 1964; Dennis et al., 2002; Gonzalez-Benito and Gonzalez-Benito, 2005; Birkin et al., 2010).

However, while the Huff Model is consumer-focused, our study introduces a turnover-based allocation model that shifts the perspective from consumers selecting stores to retailers distributing turnover among surrounding IRIS units. This difference is crucial: instead of modelling consumer choice like in the Huff Model, we aim to spatially allocate store revenue based on the distribution of store attractiveness and local grocery expenditure. The application of our model enables the computation of localized competition metrics, including the Herfindahl-Hirschman Index (HHI), a competition intensity index, and market shares at both the brand and store format levels. Our findings offer a comparative evaluation of different grocery store formats, such as discount and premium outlets, within distinct socio-economic clusters. The results indicate that store performance is not solely determined by consumer attraction but is also shaped by initial location choices within specific socio-economic environments.

Methodology.

Data Collection and Preparation

For our research, we focused our attention on a specific area of France, the Alpe-Maritimes department due to a duality of reasons. First, the territory seems large and diverse enough to understand different consumers patterns, and second, there is an abundance of interesting data for both consumers and stores. The study merged two primary datasets to carry out the analysis: a Consumer Dataset, build with several variables from ArcGIS standard demographics dataset sourced from data supplied by Michael Bauer Research GmbH; and a Store Dataset, directly provided by Nielsen IQ Panorama Trade-dimension.

The consumer dataset includes socio-demographic and economic variables at the IRIS level, the smallest statistical French area. We chose IRISs considering that they are the highest granular data at the geographical level. For each statistical unit, the dataset included variables such as geographical indicators (municipality and province of the IRIS…) population size and density, total households, average household size and households' type (single, with children, seasonal house…), educational attainment, job occupation and unemployed population, number of workers by place, median household income, purchasing power index, spending patterns, and geographical position of the IRIS (latitude and longitude). The total number of IRISs that covers the departments of the Alpes Maritimes is five hundred with an average population size of 2,194 per unit, and a total of over 1 million inhabitants. Furthermore, we calculated the percentages of several variables over the total number of people of the IRIS: for example, the percentage with a high school degree, or percentage of unemployed people. The last added variable was the average price per square meter in euro of residential buildings, recovering the data from the real estate listing website Seloger.com. The final version of the consumer dataset counted 72 variables for 500 IRISs in 163 different municipalities. Only 8 out 163 municipalities however have a population larger than 30,000 people and more than 10 IRISs present in the territory, with only the municipality of Nice with a metropolitan population over 300,000 people and more than 100 IRIS.

Our second dataset, contains detailed information of all the grocery stores in the Alpes-Maritimes department, including store locations (including latitude, longitude, city and zip code), retail format classifications, brand and owning company, sales area, and total turnover. In total we have a database with 537 grocery stores active in the area in 2024, divided in the following retail formats: 23 Hypermarkets (over 2.500 square meters),124 Supermarkets (between 400 and 2.500 square meters), 238 Minimarkets (comprehending Traditional Stores of 100 square meters or less, and Superette ranging between 100 and 400 square meters), 35 Discount stores, 50 Organic stores, and 57 Click & Drive points. For our analysis, we used all stores apart from Click & Drive, reaching a total of 480 groceries with a turnover of approximately 3.9 billion euros. Finally, we calculated the turnover per square meter of each store.

Socio-Demographic Clustering

This study employs a structured methodological approach to allocate store turnover across IRIS units using socio-economic clustering and a distance decay function. This approach allows for a refined understanding of local retail market dynamics by integrating consumer segmentation with spatial competition modelling. To capture heterogeneity in local consumer markets, we employ a two-step clustering with a k-means approach to classify IRIS units into 12 socio-economic clusters. The k-means clustering algorithm partitions observations into clusters by minimizing within-cluster variance and has been used widely in the literature for consumer studies (Gonzalez-Benito & Gonzalez-Benito, 2004, 2005; Tabianan et al., 2022) The methodology consists of the following steps:

1. *First step geographical categorization: IRIS units are initially grouped into Urban, Suburban, and Rural categories based on population density, number of businesses, and proximity to major cities. This allowed us to perform a subsequent k-means approach focused on each of these different geographical IRIS groups. The idea behind this is that Urban and Rural populations are different in terms of consumer behaviors and shopping opportunities. We prefer to compare, for instance, urban struggling neighbourhoods with urban rich areas instead of comparing the pure geographical variables with the socio-economic variables without any control of them. Doing that, we divided the 500 IRISs in 128 Rural, 126 Suburban, and 246 Urban areas. The larger number of urban IRISs is mainly due to the fact that the larger cities, such Nice, have smaller but more IRISs relative to the rural municipalities.*
2. *Socio-Demo Clustering: Within each broad category, IRIS units are further segmented using k-means clustering based on the following variables:*
   - *Demographic Indicators: Population Density, age distribution, population of French and foreign origin.*
   - *Housing and Household Characteristics: Number of households, average household size, seasonal housing percentages.*
   - *Employment and Education: Occupational structure and number of businesses, unemployment rates, and education levels.*
   - *Spending Behaviour and Economic Indicators: Expenditures on food, beverages, alcohol, and personal care; purchasing power indices; and median household income.*

The k-means clustering algorithm is executed multiple times to ensure stability in the cluster assignments. Due to the number of IRISs in the different geographic categories and by using the elbow method we divided the Rural and Suburban IRISs in three different clusters, while the Urban IRISs have been divided into six clusters. After looking at the main differences in terms of variables we assigned a qualitative tag to each of them with the objective to sum up the differences in the variables 'values. Hereafter the list of the twelve clusters:

- *Rural Isolated Agricultural and Elderly (30 IRISs)*
- *Rural Isolated Mid-Low-Income Workers (60 IRISs)*
- *Rural Residential Mid-High-Income Families (38 IRISs)*
- *Suburban Affluent Elders (17 IRISs)*
- *Suburban Mid-High-Income Families (69 IRISs)*
- *Suburban Young Working Class (40 IRISs)*
- *Urban Mid-High-Income Professionals (20 IRISs)*
- *Urban Elderly and Touristic (50 IRISs)*
- *Urban Middle-Class Families (63 IRISs)*
- *Urban Working-Class Families (53 IRISs)*
- *Urban Multiethnic Low-Income Families (21 IRISs)*
- *Urban Dynamic Young Professionals (39 IRISs)*

Turnover Allocation Model

As mentioned above, the objective of our model is to spatially allocate store revenue based on the distribution of store attractiveness and local grocery expenditure, basing our assumptions on the famous Huff Model but shifting the perspectives from the consumers to the retailers. To develop the model first we start with the distance calculation. We georeferenced each store location and linked to IRIS centroids, allowing for the calculation of driving distances, with a maximum threshold of 35 minutes' drive to ensure practical relevance. This threshold captures consumer mobility patterns within a reasonable shopping distance. To ensure more attachment to the reality we decided to use a driving distance considering the roads and infrastructure instead of moving with a classic distance calculation measure such as Euclidean distance.

After the calculation, a distance decay function is formulated to model the declining influence of a store as distance increases. The weight assigned to each IRIS-store relationship is given by:

$$W_{ij} = e^{(-\beta \cdot D_{ij})}$$

Where:

- W_{ij} *: Weight associated to the distance between IRIS* i *and store* j*.*
- D_{ij} *: Distance between IRIS* i *and store* j *(in minutes' drive)*
- β *: Decay parameter which control distance sensibility (higher means faster decay).*

The decay parameter β *is further specified as:*

$$\beta = \alpha 0 + \alpha 1 \cdot log(sales_{area}) + k = \sum_{k=1}^{K} \gamma_k \cdot Store_k$$

Where:

- $sales_{area}$ *: store sales area in square meters, that represents the attractiveness of the store*
- K *: number of types of stores (hypermarket, supermarket, discount, minimarket, organic).*
- γ_k *: coefficients linked to each type of store.*
- $Store_k$*: Dummy variable indicating the effect of the type of store (Supermarket, Discount, Hypermarket, Minimarket, and Organic Shop).*

To estimate β*, we employ the Nelder-Mead optimization algorithm, which iteratively refines the decay parameter to minimize errors between observed and predicted store turnover distributions. After calculating the decay weight, to blend more with reality, we decided to determine a cutoff threshold to avoid store making a very small amount of their turnover in faraway IRISs. We decided to opt for a small value but still relevant of 0.1 since after this value the turnover weight of the stores was fairly small.*

Moreover, we compute the total spending per IRIS i *as:*

$$S_i = (avg_spend_i \cdot population_i) + (seasonal_houses_i \cdot 0.2 + workers_i \cdot 0.2) \cdot avg_spend_i$$

Where seasonal houses, also addressable as second or holiday homes, and worker population, are weighted at 20% to account for their partial contribution to local demand. These values have been estimated considering the information about days spent by French people on their second houses and percentage of grocery shopping made in the hours immediately after work.

The turnover contribution of each IRIS to a store is then calculated as:

$$T_{ij} = S_i \cdot W_{ij}$$

And normalized as:

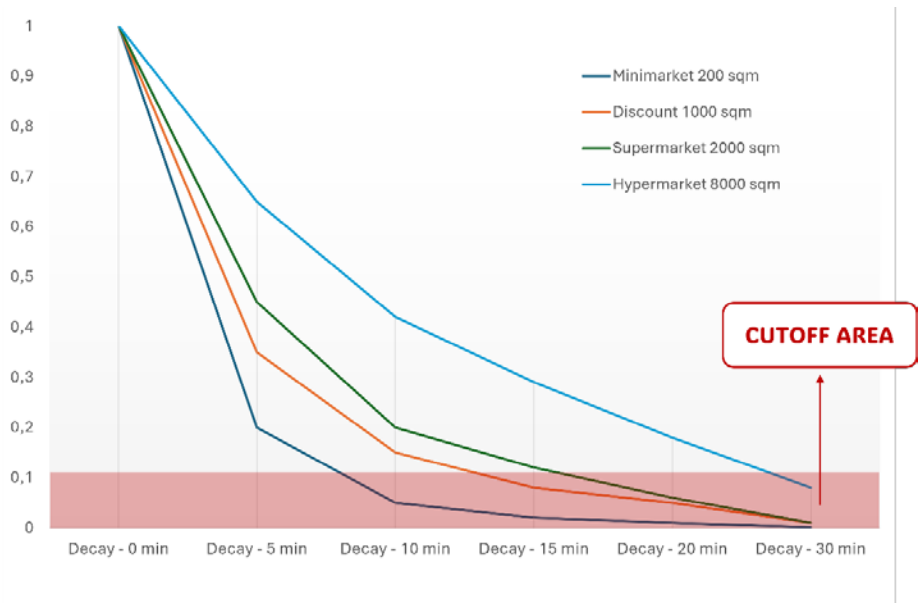
$$\tilde{T}_{ij} = \frac{T_{ij}}{\sum_i T_{ij}} \cdot T_j$$

where:

- T_{ij} *represents the turnover contribution from IRIS* i *to store* j*.*
- S_i *is the total consumer spending in IRIS* i*.*
- W_{ij}*is the decay-weighted store influence on IRIS* i*.*

This methodological framework extends traditional retail catchment modelling by focusing on turnover allocation rather than consumer choice. Unlike the Huff Model, which estimates the probability of consumer visits, our model redistributes store turnover across spatial units based on local socio-demographic factors and store attractiveness. This novel approach allows for a more precise evaluation of store performance at a micro-geographic level, offering valuable insights into the spatial distribution of grocery retail success. In the figure below an illustrative results of the attractiveness decay function depending on the store size and type.

Figure 1 - Decay Function and variations for type of store



Indexes Calculation

After the turnover allocation we had available the estimation of how much turnover has been made by each store in each IRIS. To finish our analysis, we summed up the turnover of stores owned by the same company (f) and then calculated the market shares in each IRIS simply by making the percentages of the turnover of a specific company over the total turnover on the IRIS. We repeated the process by summing up the turnover made by each type of store (discount, hypermarket…) and calculated their market share in the IRISs. Below, the formula:

$$Market\ Share_{Fi} = \frac{\sum_{j=1}^{f} \tilde{T}_{ij}}{\sum_{j' \in J} \widetilde{T_{ij'}}}$$

Starting from this point, we developed other two indexes: HHI and Competition Intensity Index.

The Herfindahl-Hirschman Index (HHI) is a widely used measure of market concentration in economics and competition analysis. We calculated it for each IRIS, so at a micro-local level, and it is defined as follows:

$$HHI_i = \sum_{f' \in F} (Market\ Share_{fi} \cdot 100)^2$$

In our local HHI we have the square of the market share of all the firms f' each IRIS i, with a value that range from 0 to 10,000, where values near zero show a perfect competitive market while 10,000 is the value for a monopolistic market. An industry is considered highly concentrated when HHI values are higher than 2,500.

Finally, to measure competition intensity, we developed a Competition Intensity Index (CII) based on the spatial distribution of competing stores. This index is constructed by summing the decay-weighted competitive presence of all stores j within a given IRIS i . The decay function applies decreasing weights to competitors as their distance from the focal area increases, ensuring that nearby stores exert a stronger competitive influence with values near 1, than those farther away with values approaching zero.

Below the simple formula:

$$CII = \sum_{j' \in J} decay\ weight_{ji}$$

By aggregating these weighted values, the index provides a continuous measure of local competitive pressure, enabling comparisons across different geographic regions and market structures.

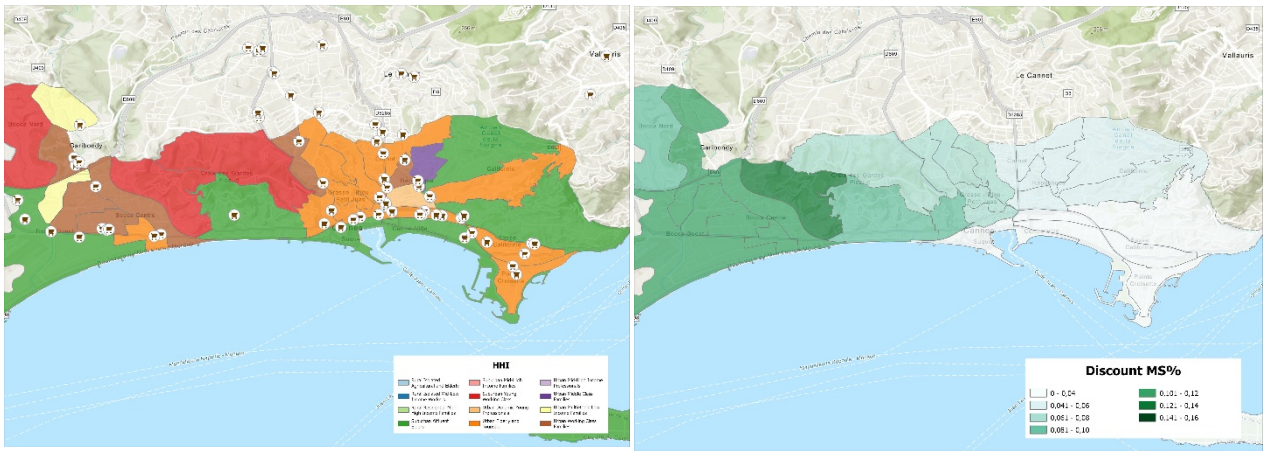
Results.

Market Shares and Socio-Economic Clusters

The market share analysis, linked with the population clusterization of the IRISs, reveals significant heterogeneity across clusters, reflecting differences in consumer preferences and competitive dynamics. Discount and premium store formats exhibit distinct performance patterns, particularly in urban areas where income disparities and household structures are more presents and can influence shopping behaviours. The results indicate that discount stores perform better in clusters characterized by lower-income households, higher unemployment rates, and a lower purchasing power.

Discounts almost double their market share in these IRIS, touching peaks of over 18% of market shares in comparison to an average value of 9%. On average, discount's market shares on the three clusters with a lower median income range between 9 and 12%, while on other urban and suburban clusters show average values between 5% and 8%. Conversely, premium brands, such Casino and Carrefour, show stronger performance in affluent areas with higher education levels, patronised mainly by young and middle-aged professionals, and with a middle-high median income level. On the figure below you can see an example of the city of Cannes. At our left we can see the different clusters present in the city, with the red, the brown, and the yellow ones, being respectively Suburban Young Working Class, Urban Working-Class Families, and Urban Multiethnic Low-Income Families clusters. We see that are found mainly on the left part of the city, which, when looking at the market share discount map, shows the greatest values, coloured in bright green.

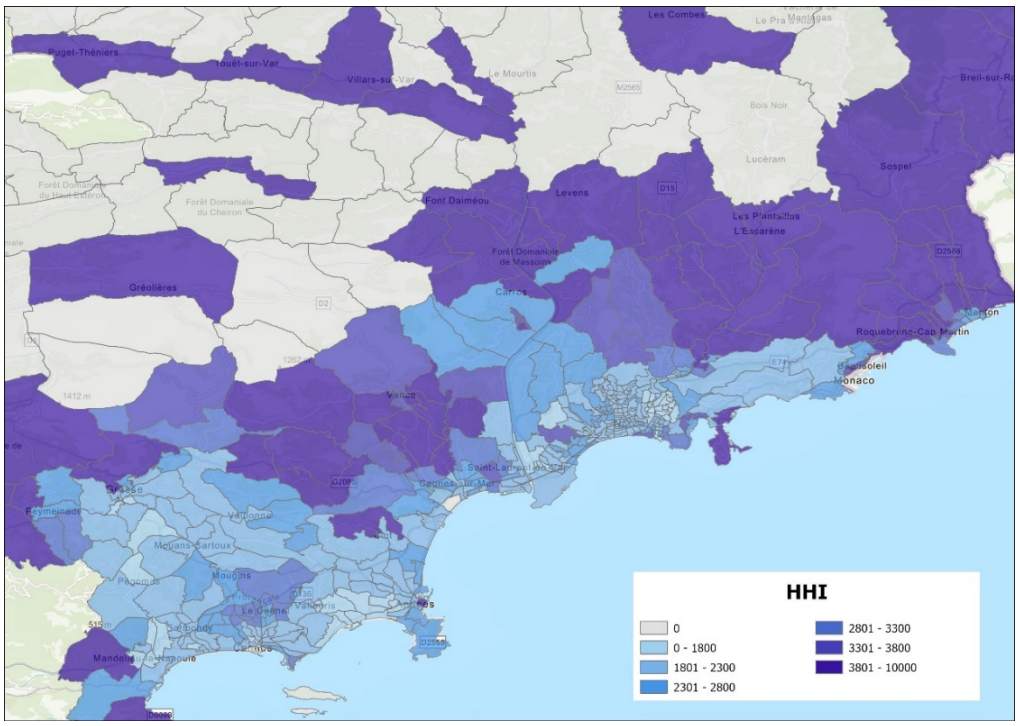
Figure 2 - Cannes Socio-Economic Clusters (left) and Market Shares of Discount Stores (right)



Herfindahl-Hirschman Index (HHI)

The HHI analysis provides insights into the degree of competition across different geographical areas. With our novel approach we are now able to look at the concentration index not merely at a city or provincial level, but a micro-local level, which can be helpful for both policymaker and industry manager to understand the real degree of concentration, and the real possibilities of consumer choices, available in a specific neighbourhood. Our results show that the French grocery retail market exhibits moderate to high concentration, with an average HHI of 2,600, slightly exceeding the threshold for oligopolistic competition.

Figure 3 - HHI of Alpes Maritimes



However, looking at the figure above, we can see that significant spatial disparities emerge:

- *Urban areas show moderate HHI values, often ranging between 1,800 and 2,300, suggesting a more balanced competitive landscape with multiple players. Leading incumbents, however, tend to maintain a large share of the local market even in the city centres, with shares often approaching 40% of the market in specific IRISs.*
- *Suburban and rural areas tend to generally have higher HHI values, indicating reduced competition and potential monopolistic tendencies due to limited store availability. Our model observes that in 27 IRISs, with an affected population of approx. 27,000 people, there is an effective monopoly, with only 1 grocery company able to attract the consumers of the area.*
- *Food deserts (shows in grey in the figure below) are identified in several rural regions, where no grocery store maintains a competitive area of attraction, forcing residents to travel long distances for groceries. 74 out 500 IRISs (15% of the total) are considered "food deserts", but in terms of population are just 30,000 out of almost 1,1 million people, so less than 3% percent of the total population of the area.*

Competition Intensity

To complement the HHI, we introduce a Competition Intensity Index (CII), which accounts for the spatial distribution of competing stores through a decay-weighted function. The CII provides a continuous measure of competitive pressure, incorporating both store proximity and attractiveness. The CII ranges from 0 to 27, with an average value of 7, indicating substantial variations in competitive pressure across regions. Notably, urban areas exhibit particularly high values, reflecting their dense retail environments and heightened market rivalry. Especially the city of Nice, having around 300,000 inhabitants, is the only municipality with a CII higher than 20, with an average value of 14, while other minor cities like Antibes and Cannes, show smoother average CII values, respectively 9 and 7. To interpret this number at a managerial level is like to imagine that 1 point corresponds to a store completely influencing the area, being very close to it. As can be expected, suburban, and especially rural IRISs have much smaller CII values, ranging from zero to four.

Research limitations. *While this study provides valuable insights into localized grocery retail competition and socio-demographic clustering, some limitations should be acknowledged. First, the turnover allocation model relies on estimated decay functions rather than actual consumer transaction data, which could introduce biases in the spatial distribution of revenues. Future research could refine this approach by incorporating real purchase data or mobile tracking information to enhance accuracy. Second, although the socio-economic clustering method effectively captures consumer heterogeneity, it does not account for dynamic changes in population composition, such as migration patterns, working force composition, or seasonal fluctuations in touristic areas, which may affect market dynamics. Lastly, the analysis focuses on a single department (Alpes-Maritimes), and while the findings are broadly applicable to similar regions, further validation in other geographic contexts would strengthen the generalizability of the results.*

Managerial implications. *The findings of this study hold significant managerial and strategic value for grocery retailers, particularly in optimizing store locations and adapting retail formats to local consumer demographics. By leveraging socio-economic clustering, retailers can tailor store assortments, pricing strategies, and promotional efforts to better align with neighbourhood characteristics. For instance, discount retailers may benefit from expanding in low-income urban clusters, while premium brands should prioritize affluent areas with high education levels. Additionally, the Competition Intensity Index (CII) provides a new tool for firms to assess local competitive pressures and refine market entry strategies. Finally, a grocery manager could apply this method to understand in which areas have better performance and consider which are the clusters of population more akin to its store's offer when looking at a new store location.*

From a policy perspective, the study offers insights for regulators and urban planners concerned with market concentration and food accessibility. The identification of food deserts highlights the need for targeted interventions, such as incentives for grocery store openings in underserved areas or policies that promote competition in highly concentrated markets. Furthermore, the micro-local analysis of HHI values can serve as a valuable input for merger control decisions, ensuring that market dominance does not reduce consumer choice at a neighbourhood level.

Originality of the paper. *This paper makes a novel contribution to the literature on spatial competition and retail market analysis by integrating socio-demographic clustering with a spatially explicit turnover allocation model. Unlike traditional approaches that analyse competition at a city or regional level, this study operates at a micro-local scale, enabling a more granular understanding of how different grocery formats interact with local consumer segments. The development of the Competition Intensity Index (CII) further extends existing competition metrics by incorporating the spatial distribution of competing stores and their attractiveness. Additionally, the application of a decay-weighted turnover model-inspired by the Huff Model-provides a more realistic estimation of grocery store performance across IRIS units. By bridging socio-economic segmentation with spatial competition analysis, this research offers both theoretical advancements and practical tools for industry stakeholders and policymakers.*

Key words: *retail competition; catchment area; market concentration; socio-demographic clustering; spatial analysis;*

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Sustainable value propositions and the purchasing gap: a consumer-centric analysis

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Abstract

Sustainable business models (SBMs) integrate environmental, social, and economic dimensions into their value propositions, yet little research has explored how consumers perceive and respond to these propositions. This study investigates the extent to which consumer awareness of sustainable business practices influences purchasing decisions and whether the perception of sustainable value can provide a competitive advantage for companies. Using a qualitative approach based on 21 semi-structured interviews, the research employs thematic coding and sentiment analysis performed with Python to systematically assess consumer attitudes. The results indicate that while sustainability is generally perceived positively, its direct influence on purchasing behavior remains limited, with a significant proportion of neutral responses. However, sustainability is more widely recognized as a strategic advantage for businesses, suggesting that firms can strengthen their market positioning by effectively communicating the added value of their sustainable practices. The findings offer valuable insights for both research and management, highlighting strategic opportunities for firms aiming to enhance consumer engagement in the sustainability transition.

Framing of the research. *Sustainability has increasingly become a central concern in both academic literature and business practice, driven by growing environmental challenges, regulatory pressures, and changing consumer expectations (Azmat et al., 2023). Companies are progressively adopting sustainable practices not merely as a response to external pressures but also as a strategy to differentiate themselves in the marketplace (Bager & Lambin, 2020). In this context, sustainable business models (SBMs) have emerged as a promising approach to creating, delivering, and capturing value in ways that benefit not only the organization but also society and the environment (Neesham et al., 2023; Peric et al., 2017; Azmat et al., 2023). Unlike traditional business models, SBMs incorporate environmental, social, and ethical dimensions into their core value proposition, aiming to achieve long-term viability while addressing stakeholder concerns (Neesham et al., 2023; Roome & Louche, 2016). However, the extent to which consumers recognize and reward this sustainable value proposition remains an open question. in fact, little attention has yet been paid in the scientific literature to the implications of adopting sustainability in specific components of the business model, such as the value proposition (Ilyas & Osiyevskyy, 2022). SBMs are commonly described as frameworks that integrate three essential elements: sustainable value proposition, value creation and delivery mechanisms, and value capture systems (Vehmas et al., 2024; Bocken et al., 2014). The sustainable value proposition refers to what kind of value is offered to customers, society, and the environment through products or services; the value creation and delivery mechanisms encompass how the organization generates this value sustainably, often requiring innovations in supply chains, production processes, and stakeholder engagement; finally, the value capture system deals with how the company translates sustainable value into economic returns, such as profitability, brand loyalty, or pricing power (Vehmas et al., 2024; Bocken et al., 2014). As mentioned above, despite significant academic interest in these models, a key challenge persists in understanding how consumers perceive and respond to the sustainable value created by companies. To date, the majority of studies on sustainable business models have concentrated on developing sustainable value propositions, while limited attention has been given to how customers perceive and interpret the value delivered through these propositions (Lukkanen & Turan, 2022). Several studies have highlighted that the perception of sustainability by consumers can influence purchasing behavior, particularly among ethically conscious and environmentally aware segments (Lukkanen & Turan, 2022; Duarte et al., 2024; Malhotra et al., 2024). Nevertheless, consumer behavior regarding sustainable products and services often presents inconsistencies, commonly referred to as the "attitude-behavior gap" (Park & Lin, 2020), where positive attitudes toward sustainability do not always translate into purchasing actions. The discrepancy between intention and*

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actual purchasing behavior also remains poorly understood (Park & Lin, 2020) and is specifically referred to as the "ethical purchasing gap" (Nicholls & Lee, 2006; Park & Lin, 2020). Given the complexity of consumer behavior and the multi-faceted nature of sustainability, further research is needed to explore how consumers perceive the sustainable value proposition and whether this perception can act as a source of competitive advantage for companies.

Purpose of the paper. *This study seeks to explore how consumers perceive the sustainable value proposition and whether this perception can provide a competitive advantage to companies. Specifically, the research addresses two key questions:*

RQ1: To what extent does consumer awareness of sustainable business practices influence their purchasing decisions?

RQ2: Can the perception of sustainable value provide a competitive advantage to companies adopting sustainable practices?

If consumers perceive sustainability as a core component of value, companies adopting SBMs could benefit from increased customer loyalty, premium pricing, and enhanced brand reputation (Sudjono, 2024; Agu et al., 2024; Ameyaw et al., 2024). Conversely, if sustainability remains a secondary consideration, the potential for competitive advantage may be limited (Jiao et al., 2022). The originality of this research lies in its dual approach: it combines qualitative insights from semi-structured interviews with advanced text analysis techniques to uncover patterns in consumer attitudes toward sustainability. The findings are expected to offer valuable implications not only for academic discourse but also for managerial practice, providing actionable insights for companies seeking to leverage sustainability as a competitive advantage.

Methodology. *This study adopted an exploratory and qualitative research approach (Thomas, 2006), using semi-structured interviews as the primary data collection tool. A diverse sample of consumers was selected, segmented by age and education level, to capture variations in the perception of sustainable value propositions (Tab. 1). The interview framework was designed to explore participants' attitudes toward sustainable business models, their understanding of sustainable value, and the contextual factors influencing their purchasing decisions. All interviews were audio-recorded and transcribed. A dataset was constructed containing the following variables: participant ID, age, education level, occupation, question, response, and category. Thematic coding was performed manually to categorize responses according to their relevance to each research question (Byrne, 2021). This process allowed for the identification of key themes and ensured that responses were systematically associated with the most relevant RQ. Following this thematic classification, a sentiment analysis was conducted for each RQ (Stine, 2019), leveraging Python-based text analysis techniques. Descriptive statistical analyses were applied to explore general trends in the data, while sentiment scores were computed to assess the polarity of responses (Poria et al., 2020). The sentiment analysis was performed by assigning sentiment scores to the responses within each thematic category, enabling a structured interpretation of consumer attitudes. This approach facilitated a deeper understanding of how consumers perceive the relationship between sustainability and purchasing behavior (RQ1) as well as the potential competitive advantage of sustainable business practices (RQ2). By integrating qualitative thematic analysis with computational text analysis, this study provides a comprehensive evaluation of consumer perceptions regarding sustainability, offering both interpretative depth and data-driven insights.*

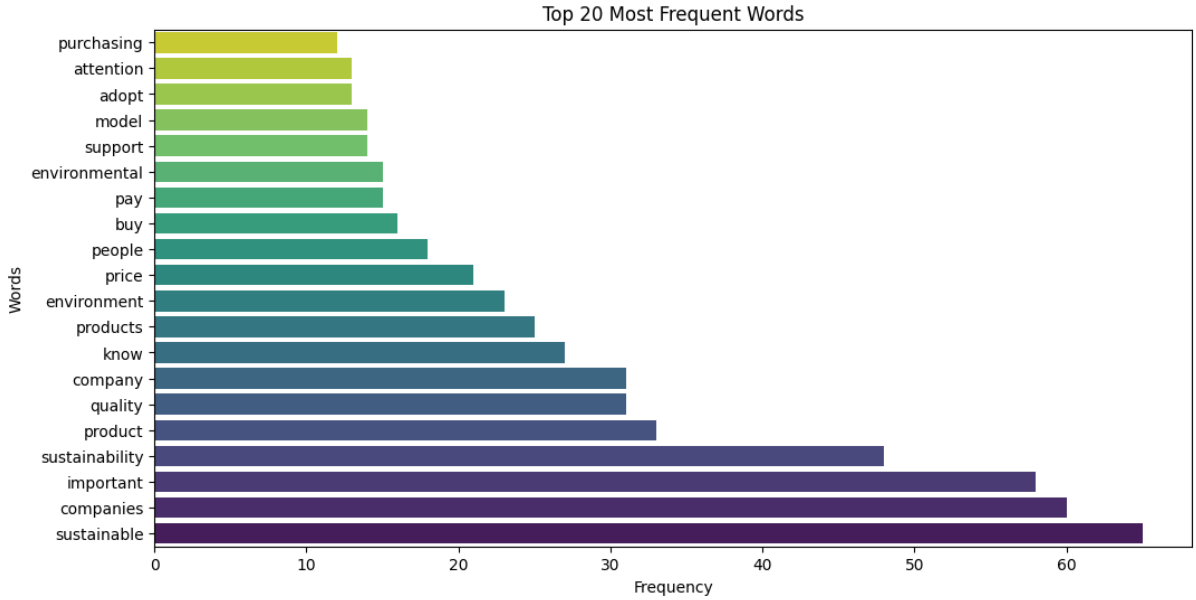
Tab. 1: Interviewees

INT. ID	AGE	EDUCATION LEVEL	OCCUPATION
INT. 1	23	Bachelor's degree	Student
INT. 2	27	Master's degree	Architect
INT. 3	35	High school diploma	administrative secretary
INT. 4	31	Bachelor's degree	Trader
INT. 5	46	High school diploma	Public Employee
INT. 6	36	High school diploma	Military
INT. 7	25	Master's degree	Corporate Employee
INT. 8	24	High school diploma	Student
INT. 9	53	Bachelor's degree	Employment Consultant
INT. 10	31	Bachelor's degree	Corporate Employee
INT. 11	63	Middle high school	Not employed
INT. 12	38	Master's degree	Architect
INT. 13	57	Middle high school	Craftsman
INT. 14	52	Master's degree	Public Employee
INT. 15	23	Bachelor's degree	Student
INT. 16	54	Master's degree	Teacher
INT. 17	36	Master's degree	Phsycologist
INT. 18	24	Bachelor's degree	Student
INT. 19	24	Master's degree	Corporate stagist
INT. 20	33	Master's degree	Social worker
INT. 21	66	High school diploma	Retiree

Results. *The results suggest that participants view sustainability not only as a criterion in their decision-making processes but also as an ethical value that guides their purchasing behavior. The frequent appearance of words (Fig. 1) such as "companies" (60 occurrences), "important" (58 occurrences), "product" (33 occurrences), and "quality" (31*

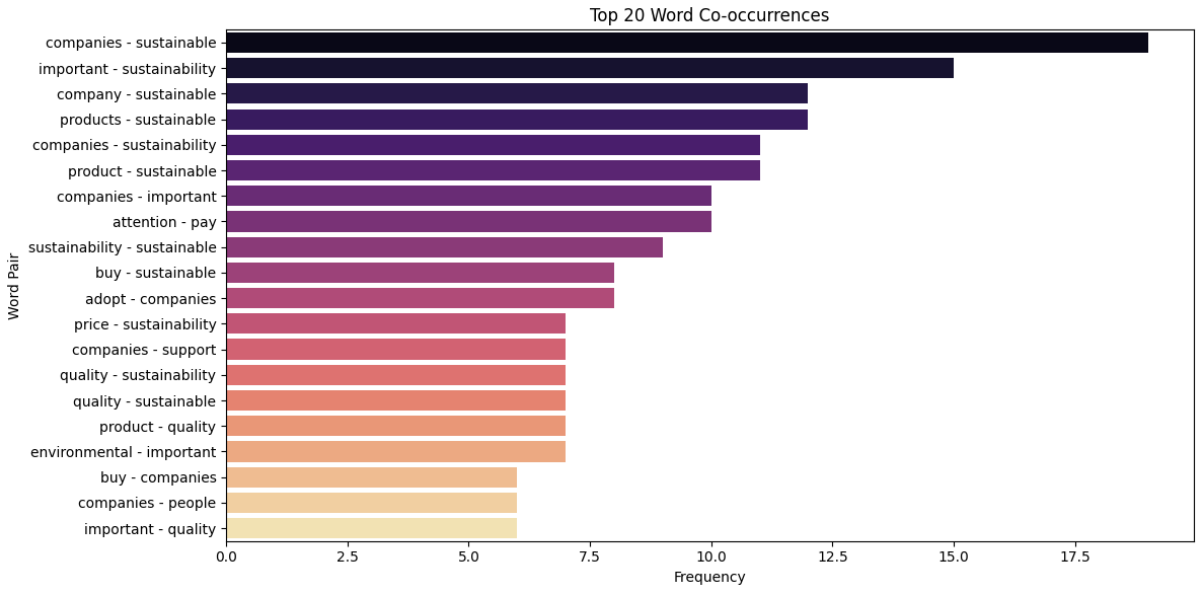
occurrences), as revealed by the frequency analysis, confirms that respondents associate sustainability with an improvement in quality, indicating a perception that companies adopting sustainable practices offer more valuable and responsible products.

Fig. 1: Word frequency graphic



The lexical co-occurrence analysis revealed significant connections between key terms (Fig. 2). For example, the co-occurrence of the terms "important-sustainability" (16 occurrences) suggests that consumers consider sustainability a crucial factor in their purchasing decisions. At the same time, the occurrence of "attention - pay" (11 occurrences), "buy - sustainable" (8 occurrences), "price - sustainability" (7 occurrences), "quality - sustainability" (7 occurrences), "product - quality" (7 occurrences), "important - quality" (6 occurrences) emerges, indicating that while sustainability is relevant, product quality and purchase are key dimensions.In line with the exploratory and data-driven nature of the study, the analysis was guided by the most salient patterns identified through the data mining process. Specifically, factors such as quality, availability, and price emerged as the most significant drivers of user interest and engagement. Conversely, other dimensions—including customer loyalty—did not show a meaningful presence in the data and, in some cases, appeared to play a marginal or even inverse role. As such, the discussion deliberately concentrates on the empirically grounded insights, prioritizing those variables that demonstrated clear relevance within the dataset. This methodological choice ensures that the interpretation remains faithful to the evidence, while acknowledging that less prominent factors, though potentially of theoretical interest, were beyond the scope of this data-focused investigation and could be tested in future studies.

Fig. 2: Co-occurrence graph



The associations emerged also confirm that a positive perception of the environmental and social benefits of a product can guide consumers toward more responsible choices, provided that the products are perceived as good quality and not excessively expensive. This is further supported by the qualitative analysis:
INT.1: "Sustainability factor is important as much as quality, and still even though maybe the price is higher I might still consider buying";
INT.2: "Sustainability is certainly a factor I consider, although I also let myself be guided by other elements such as convenience."
INT.6: "Sustainability is definitely a deciding factor for me. If I know a product is made sustainably, I prioritize that over the cost factor."

From the sentiment analysis, it emerged that the responses related to RQ1, i.e., consumer awareness regarding sustainable business practices, were mostly neutral (105 responses) (Fig. 3, Fig.4). Most of the responses collected have a neutral tone, suggesting that many respondents do not express a clear or strong opinion about the influence of sustainability on their purchasing decisions. This could indicate limited awareness or uncertainty in linking sustainability to their consumption choices. A lower number of responses show positive sentiment (75 responses), indicating that consumers view sustainable practices favorably and consider them an influential factor in their purchasing decisions. A minority of 35 responses have a negative tone, suggesting that some consumers are skeptical or believe that sustainability does not influence their purchasing choices or that sustainable practices have little credibility or are ineffective. Sentiment analysis suggests that although there is a degree of awareness and appreciation for sustainability in purchasing decisions, many consumers remain neutral, perhaps due to a lack of information or limited influence of this factor compared to other purchasing criteria (such as price, quality, availability).

Fig. 3: RQ1 Sentiment Distribution

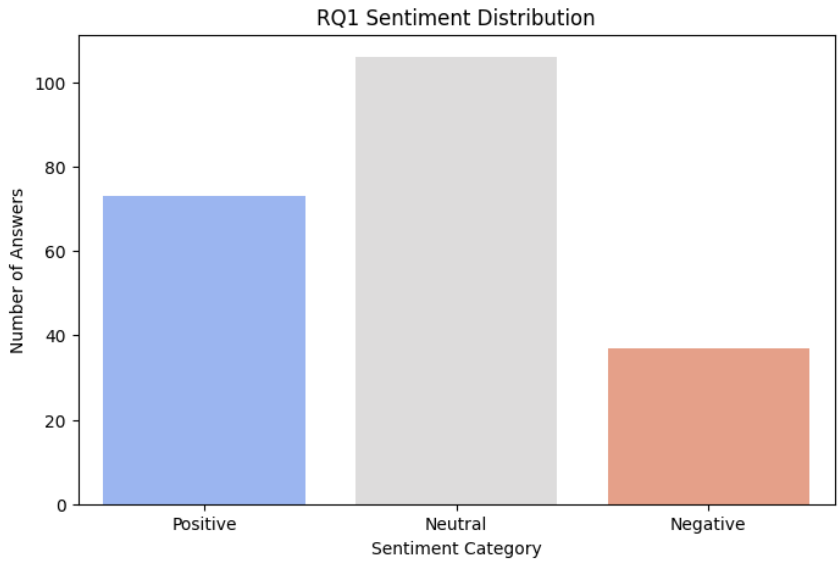
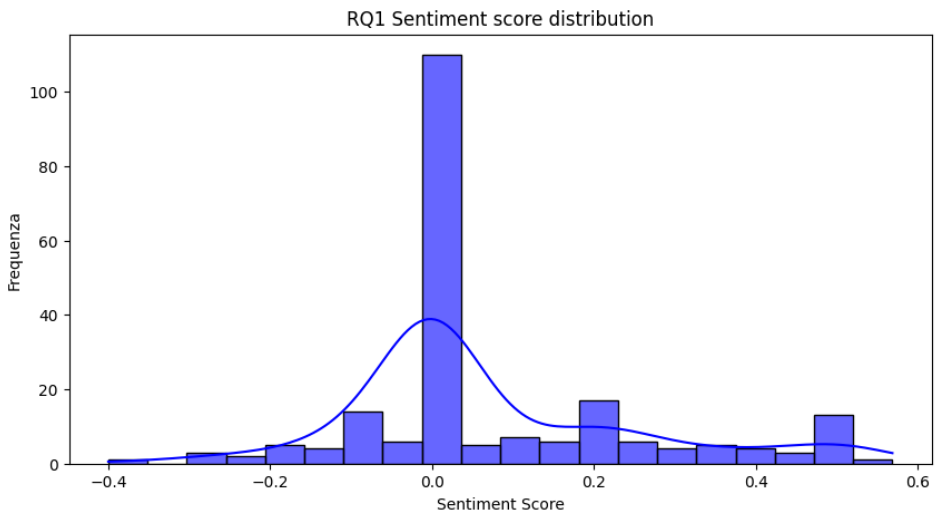


Fig. 4: RQ1 Sentiment Score Distribution



This suggests that sustainability is generally perceived positively or in a neutral way, and participants are willing to consider it an influential factor in their purchasing decisions, as also revealed in the semistructured interviews:
INT.1: "Even if I pay a little more I know I did a good deed, I feel better"
INT.3: "If I know a product is sustainable, I avoid harming the environment and also support the people working there. So, yes, I choose the more sustainable one over the one that is not."
INT.4: "I believe it can benefit the environment and raise awareness among people, and it is right to consider all this."
INT.7: "For me, it is very important that a company adopts a sustainable business model, and it is a factor that can lead me to choose it over others."
INT.12: "For some companies, I've stopped buying because they don't adopt sustainable practices; in fact, I avoid them completely."
INT. 13: "We're still in the early stages on this issue, but I think in the future it could have a positive impact. I believe it's important to continue down this path, so yes, I am influenced by this."
INT.20: "I stop buying from companies I find out are not sustainable."

However, the sentiment analysis associated with RQ2 revealed some ambivalence, with a more balanced distribution between positive and neutral responses (31 positive, 35 neutral, 5 negative), suggesting that sustainability is seen as a possible competitive advantage, although many remain uncertain (Fig. 5, Fig. 6). The positive perception is indeed relevant and suggests that companies could benefit from sustainable practices in terms of image and market positioning. The very low number of negative responses thus indicates that most respondents do not view sustainability as a disadvantageous factor for companies. The sentiment results confirm the ethical purchasing gap, as people's interest in the ethical aspects of sustainability clearly emerges from the interviews, but when it comes to purchasing, and thus quality and price, sentiment remains mostly neutral.

Fig. 5: RQ2 Sentiment Distribution

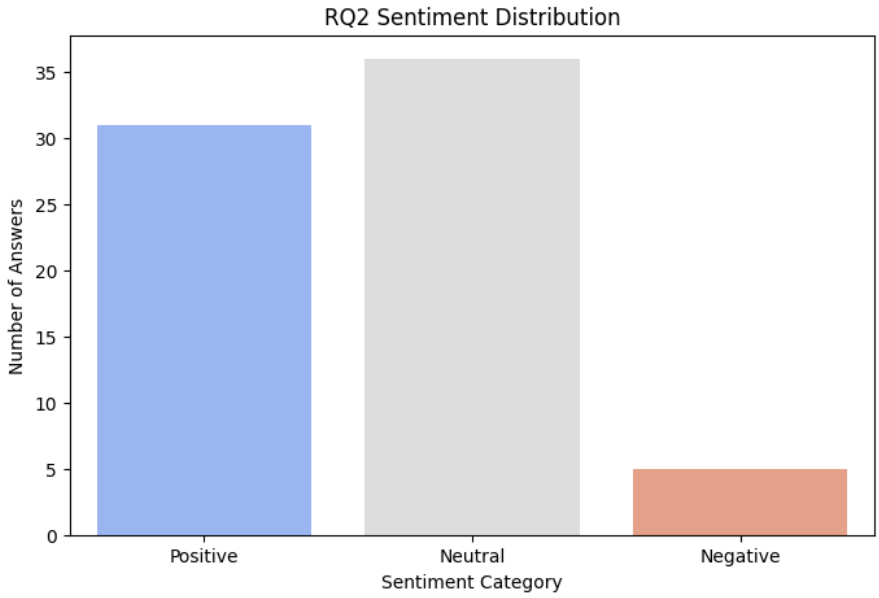
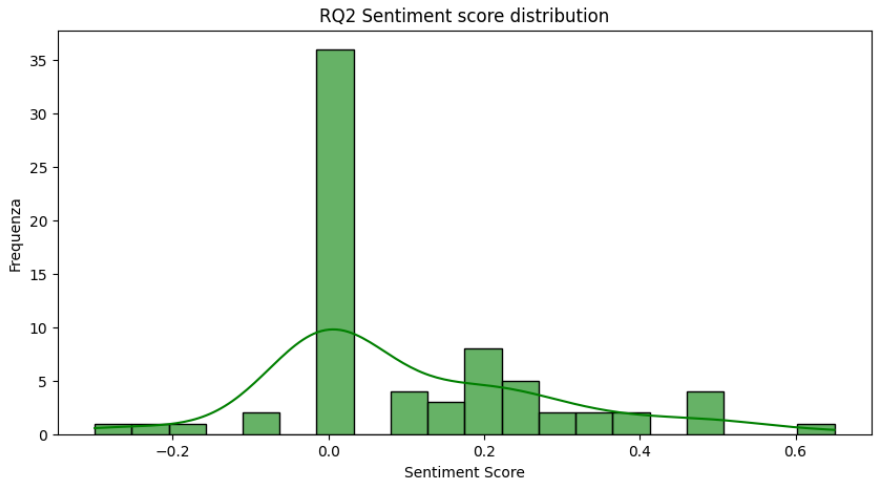


Fig. 6: RQ2 Sentiment Score Distribution



Moreover, the analysis of open-ended responses revealed partial knowledge regarding the concept of sustainable business models. Although some participants demonstrated a good understanding, many stated they had a limited view, particularly regarding the social aspects of sustainability. However, when provided with clarifications on the topic, some participants developed a more positive and favorable view toward sustainable practices. This indicates the presence of an information gap that could be addressed through awareness campaigns and educational programs, contributing to a more comprehensive and shared understanding of sustainability in business practices.

INT. 13: "There is still a lack of strong awareness on this issue. We hear a lot about sustainability, but attention is still limited."

Finally, the analysis highlighted how price perception is a central element in purchasing decisions. Despite the higher price associated with sustainable products, respondents showed a willingness to pay a premium price, provided that the sustainability-related benefits are clearly communicated.

INT.4 "what I truly want is to purchase a valid product, not just a price."

INT.16: "I care about the price, but if I could choose a sustainable product at a slightly higher price, I would buy it."

This result suggests that companies adopting sustainable practices could justify higher pricing policies by emphasizing the added value of sustainability, thus potentially gaining a competitive advantage in strengthening their reputation for environmental and social responsibility.

Research limitations. *This study presents some limitations that should be considered when interpreting the results. First, the small sample size may limit the generalizability of the findings, highlighting the need for further research on a larger population to validate the observed trends. Additionally, a brief explanation of certain sustainability-related concepts was provided during the interviews to ensure a common understanding among participants. While this may have influenced their reflections to some extent, the aim was to facilitate a more informed discussion rather than directly shape their responses. Finally, although the findings highlight price as a significant barrier to purchasing sustainable products, the study does not explore in depth the relationship between respondents' stated willingness to pay a premium price and their actual financial capacity. Future research could further investigate this aspect by examining the connection between purchase intentions and real economic personal and family constraints.*

Managerial implications. *The findings of this study offer valuable insights for businesses seeking to integrate sustainability into their strategies. The sentiment analysis highlights that while many consumers recognize the importance of sustainable business practices, their impact on purchasing decisions remains nuanced. Given the prevalence of neutral responses, companies should focus on enhancing consumer awareness by clearly communicating the tangible benefits of sustainability, such as cost savings, product quality, and ethical responsibility. For businesses aiming to leverage sustainability as a competitive advantage, it is crucial to align sustainability messaging with consumer values and expectations. The positive sentiment observed in RQ2 suggests that firms adopting sustainable practices can strengthen their brand image and market positioning. However, to translate this perception into actual consumer behavior, companies must emphasize transparency, credibility, and differentiation in their sustainability initiatives. Additionally, the thematic analysis reveals that sustainability alone may not be a decisive factor in purchasing choices unless it is combined with other key drivers such as affordability, convenience, and perceived value. This underscores the need for companies to integrate sustainability into a broader value proposition rather than relying solely on ethical appeal anchoring to the value's wheel of the individual. Finally, businesses should consider targeted communication strategies based on demographic segmentation, as age and education levels may influence how consumers perceive and respond to sustainability efforts and their awareness of them. By leveraging data-driven insights from sentiment analysis, companies can refine their marketing strategies, enhance customer engagement, and foster and leverage a more sustainability-conscious consumer base.*

Originality of the paper. *This study makes a great contribution to the existing literature by shifting the focus from the traditional design of sustainable business models to the consumer's perception of sustainable value propositions, an area that remains underexplored in sustainability research and with a new methodological approach. The extended abstract reflects the prevailing enthusiasm and widespread discourse surrounding sustainability; however, it also highlights the persistent gap between rhetoric and concrete action. While there is significant awareness and goodwill, true transformative change remains elusive, as meaningful engagement and tangible commitments are still insufficient.*

While much of the previous literature predominantly examines sustainability from a firm-centric perspective, analyzing the adoption of green technologies, operational efficiency, and corporate social responsibility, this paper takes a consumer-centered approach Adopting a new methodological approach—one that is not quantitative but instead captures the key dimensions of people's speech and perceptions of language. By focusing on how consumers perceive and evaluate sustainability in their answer as a key factor in purchasing decisions, this research adds depth to the understanding of sustainability from the viewpoint of the end-user. What sets this study apart is its integration of both qualitative and computational text analysis methods, which allows for a comprehensive exploration of consumer attitudes toward sustainability. Semi-structured interviews provide rich, in-depth qualitative data, offering direct insights into how consumers interpret and relate to sustainable practices.

The application of Sentiment Analysis, on the other hand, offers a powerful tool to analyze the emotional and cognitive dimensions of these responses at scale, uncovering hidden patterns and nuanced shifts in consumer perceptions. This methodological innovation provides a more dynamic and data-driven approach to studying sustainability, going beyond traditional survey-based techniques and offering a novel lens for understanding consumer behavior. Furthermore, the study uncovers key trends in consumer attitudes, revealing how perceptions of sustainability might influence purchasing

behavior and even become a driver for competitive advantage in the marketplace. The findings contribute to the ongoing discourse on sustainable business practices by highlighting the critical role of consumer awareness, the barriers to sustainable consumption, and the factors that shape the perceived value of sustainability. This paper, therefore, provides both theoretical and practical implications, offering actionable insights for managers seeking to leverage sustainability as a strategic differentiator. By identifying the conditions under which sustainability perception translates into a competitive advantage, the study informs companies on how they can align their sustainability efforts with consumer expectations and preferences, ultimately driving greater engagement and loyalty.

Key words: *Sustainable Business models (SBMs); Consumer behaviour; Sustainable Value Proposition; Purchasing behaviour*

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Health and Healthy Eating. Retailers' Communication and Consumers' Perception in Online conversations

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Abstract

This study explores the online communication of Italian traditional retailers and discounts in relation to nutrition marketing, using the web listening methodology. The aim is to analyze how retailers address the topics of healthy eating, health, and well-being, and how their actions in these areas are perceived by users. The analysis was based on online conversations in 2024 and focused on three main themes: health, healthy eating, and well-being. Data were collected through the Blogmeter platform. The results showed a low prevalence of online discussions related to nutrition marketing, with traditional retailers and discount stores showing different performance levels in terms of engagement and sentiment. Furthermore, a discrepancy emerges between the official communication of retailers and consumers' perceptions, suggesting that transparency and attention to nutritional quality are important factors in improving retailers' online reputation, particularly for discount stores. This study provides useful insights for optimizing nutrition marketing strategies and enhancing the interaction between retailers and consumers. The limitations and implications are also discussed.

Framing of the research. *In recent years, the increase in diseases related to poor dietary habits, such as obesity, diabetes, and cardiovascular diseases, has driven consumers to become more aware of the importance of making informed and responsible food choices (Archundia Herrera et al., 2017; Chen et al., 2023). This has led to a progressive increase in the adoption of healthier eating habits (Steinhauser & Hamm, 2018). This change is part of a broader cultural and social transformation, reflecting a growing interest in individual well-being, disease prevention, and adoption of healthy lifestyles (WHO, 2022).*

The growing interest in more conscious food choices has prompted consumers to actively seek healthier options, a shift that retailers have been called upon to support (Willett et al., 2006). Retailers, through nutrition marketing initiatives, play a key role in guiding consumers' eating habits (Willett et al., 2006; Hecht et al., 2020). Retailers' marketing strategies focused on healthy nutrition have been the subject of numerous studies, which have organized them according to the "4Ps" of the marketing mix: product, price, place, and promotion (Scapin et al., 2025). Some examples of these strategies include expanding assortments to include healthier food options, modifying packaging to make it more attractive or informative, and adopting nutritional labels and claims that highlight health benefits (van't Riet, 2013; Cameron et al., 2016). Additionally, increasing the accessibility of healthy products, for instance through discounts or cashback, is a common strategy to encourage the consumption of healthier foods (Ball et al., 2015; Cameron et al., 2016). Other initiatives include changes to the physical layout of stores or product placement, aimed at promoting healthier food choices (Cameron et al., 2016). Finally, in-store campaigns, as well as TV, online, social media, and outdoor advertising, are used to raise consumer awareness and promote the consumption of healthier foods (Scapin et al., 2025; Cameron et al., 2016).

Consumer perceptions of these initiatives have also been the focus of various studies (Gaur et al., 2024; Van Kleef et al., 2012; Samoggia et al., 2019). Specifically, consumers tend to associate specific product attributes, such as clear labels, minimally processed ingredients, and attractive packaging, with the nutritional value and healthiness of food (Asioli et al., 2017). Furthermore, placing healthy food products at eye level or in more visible locations significantly increases the likelihood of purchase (Van Kleef et al., 2012). Online communication, particularly on social media, also plays a decisive role in shaping consumers' perceptions of healthy foods. Promotional activities and advertising

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campaigns by retailers have a significant impact on purchase intentions (Franco-Arellano et al., 2020). Social media are particularly effective as participation in health-oriented social networks and online communities influences food choices, increasing the social desirability of healthier products and lifestyles (Kokkoris & Stavrova, 2021). Furthermore, the presence of retailers on social media is essential for engaging consumers, building trust, and positively influencing purchasing behavior towards healthy food products (Purwanto et al., 2021; Samoggia et al., 2019).

Despite the rich literature on consumer perceptions regarding nutrition marketing strategies, none of these studies have investigated retailers' communication in relation to consumer perception through direct data, such as that provided by social media. The methodology of web listening allows for a more complete and authentic understanding of public perceptions on these topics, based on user-generated content (UGC), which directly and unfiltered reflects individuals' opinions and experiences. In today's digital era, online users generate a massive amount of data, and the growing availability of user-generated content provides a vast repository of information on attitudes, motivations, and opinions. These data have been widely used in research across various sectors, such as healthcare (Marchetti et al., 2022), tourism and hospitality (Marcolin et al., 2021), politics (Wu et al., 2020), and sustainability (Bellini et al., 2024; Ceccoli & Vergura, 2024), highlighting how UGC can provide valuable insights into individuals' attitudes and emotions. Listening to online conversations represents a unique opportunity to access spontaneous debates free from research bias, thus allowing for a more genuine and direct understanding of public opinion.

Purpose of the paper. *This study uses a web listening methodology to investigate, on the one hand, the online communication strategies adopted by Italian grocery retailers to convey their actions in the field of nutrition marketing, and on the other hand, users' perception of these actions. Specifically, the research aimed to examine how retail brands (traditional retailers and discount brands) address issues related to healthy eating and compare this communication with what consumers perceive and consider relevant. Through a planned and systematic online listening activity, it was possible to identify the most discussed retail brands and explore the main topics of discussion that users associate with the concept of healthy eating. This made it possible to explore potential discrepancies between the official communication of these brands and the expectations, preferences, or perceptions of the public. The research provides valuable insights into what consumers truly value when discussing healthy eating and offers support for the communication strategies of food industry companies in the area of nutrition marketing.*

Methodology. *The research design utilized a mixed-methods approach, combining quantitative and qualitative textual analysis (Andreotta et al., 2019). The analysis was conducted using the Blogmeter Suite, a web and social intelligence platform that enables the collection and analysis of user conversations on social media and other web platforms (Facebook, Twitter, Instagram, YouTube, TikTok, Twitch, forums, blogs, news, and app review sites). The platform extracts textual data from a database of over 2 billion documents, collected both from the official application programming interfaces (APIs) of social networks and from Blogmeter's proprietary web crawlers.*

The analysis, which covers the period between January and December 2024, was preceded by two preliminary phases. The first phase involved a survey of the most grocery discussed retail brand online in the Italian context, with particular attention to traditional retail and discount brands. From this step of analysis, seven brands emerged, divided into four Italian traditional retailer and three discounts. The second phase involved the selection of the terms most commonly associated with the nutrition marketing strategies implemented by these brands. Three main themes were identified: health, healthy eating, and well-being. Once the preliminary phases were completed, the main analysis was conducted, which involved creating sub-sets of specific keywords for each theme and for the selected brands. For the well-being theme, terms such as "well-being," "wellness," and "feel good" were considered. For health, terms like "health," "healthy," "healthcare," "health," "medicinal," and "prevention" were included. Finally, for healthy eating, keywords like "healthy eating," "nutrition," "nutritionist," "dietitian," and "food pyramid" were selected. The overall dataset was then manually cleaned, retaining only occurrences of the keywords relevant to the themes under analysis.

For the quantitative analysis, the following metrics were used: total messages, mentions, engagement, and positive/negative sentiment. ***Total Messages*** *refers to the total number of posts that, within the analysised period, mention at least one of the relevant keywords (in this case, the retail brands in general). This metric includes all comments on these posts, regardless of when they were written.* ***Engagement*** *measures the total number of interactions associated with the posts, including reactions, likes, shares, and views (for platforms such as TikTok and YouTube).* ***Mentions*** *represent the total number of posts and/or comments that contain the analyzed keywords. Each mention constitutes a segment of online content that includes one of the keywords of interest. This analytical framework provides valuable insights into the digital visibility and user engagement levels of different retail brands, facilitating a comparative evaluation of their online impact. Moreover, subsets of data were extracted and subjected to a more in-depth qualitative analysis.*

Results. *The analysis of general online conversations (not only those involving the topics under attention) around the seven retail brands considered highlights how certain brands generate greater discussion and user engagement compared to others. This phenomenon was assessed using three key indicators "Total Messages", "Engagement", and "Mentions".*

According to the analysis (Figure 1), ***Discount 1*** *emerges as the most discussed brand, accounting for 27% of total messages, and demonstrates a high level of online engagement, with 50% of total interactions. This indicates that users frequently discuss this brand and that its content generates significant interest, often being shared, commented on, and accumulating a high number of likes and views. Following Discount 1,* ***Retailer 1*** *and* ***Retailer 2*** *also generate substantial discussion, although their overall centrality in conversations is lower (accounting for 26% and 16% of total messages, respectively). Notably,* ***Retailer 1*** *exhibits a strong level of engagement (17%), although it remains below the level achieved by* ***Discount 1****. Conversely,* ***Retailer 2****, despite having a significant number of mentions (28%), fails to generate*

a high level of engagement, accounting for only 3% of total interactions. This suggests that while the brand is frequently mentioned, it does not effectively capture users' interest or drive meaningful interaction.

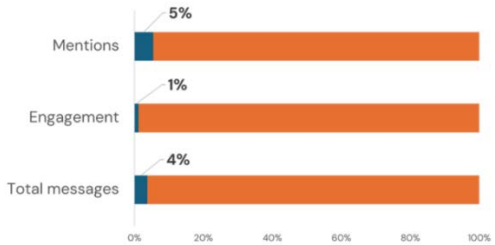
*In contrast, **Retailer 4**, despite having a relatively low share of total messages (7%) and mentions (6%), stands out for its high engagement levels, ranking as the third most engaging brand (13%). This indicates that, although fewer posts about the brand are published, they elicit substantial interest, generating a high number of interactions per post. Lastly, **Retailer 3** ranks fourth in terms of mentions, accounting for 14% of the total, and having a low engagement level and a relatively small number of messages. This suggests that while the retailer is frequently referenced, it does not generate substantial interaction among users. Meanwhile, **Discount 2** and **Discount 3**, exhibit more consistent performance across all analyzed metrics. However, they remain at the lower end of the rankings compared to the other brands.*

Fig. 1: "Total Messages", "Engagement" and "Mentions" KPIs of the seven retail brands

Source: our elaboration

In the preliminary stages of the analysis, health, healthy eating, and well-being have been identified as the key terms associated with the nutrition marketing strategies adopted by the brands. However, when examining online conversations about these brands more broadly, these topics occupy a relatively marginal space. The data reveal that, out of the total volume of discussions, these themes appear in only 5% of mentions, 1% of engagement, and 4% of total messages (Figure 3). These findings suggest that retail brands address nutrition marketing topics less frequently than other subjects in their online presence. As a result, users also tend to engage less with these themes in their discussions.

Fig. 3: Percentage of KPI topics over total retail KPIs



Source: our elaboration

Additionally, conversations about health, healthy eating, and well-being often overlap. In discussions on healthy eating, health is mentioned in 50% of cases, while 18% also refers to well-being. Similarly, half of the well-being discussions relate to health, with around 2K posts covering all three topics simultaneously. These findings support existing research on their interconnection (WHO, 2022; Archundia Herrera et al., 2017; Chen et al., 2023).

When analyzing the most common terms and hashtags used by Italian users regarding health, healthy eating, and well-being in relation to traditional retailers and discounters, the conversation remains broad and generic. Rather than focusing on specific products or product lines, discussions focus on high-level themes (Figure 4).

Fig. 4: Cloud per topics and retailers

Source: our elaboration

Among the most commonly used terms, the following thematic groups emerge:

- ***Inspirational terms*** *(highlighted in red) include words such as "project", "initiative", "participate", "improve", "engage", and "dedicate" that refer to campaigns and initiatives promoted by the retailers, rather than to the products they offer in their stores. Examples include "Benessere è Equilibrio", an initiative promoted by a traditional retailer in support of an oncology institute; the "Percorso dei Campioni" program promoted by another traditional brand; or the collaboration between a traditional retailer and a foundation for cancer research.*
- ***Terms related to the composition and production of products*** *(highlighted in blue). In this case, the discourse focuses on the quality and specific characteristics of the products, often analyzing their composition, supply chain, and production practices. These topics can also take on a negative connotation, as seen in cases of product recalls or potential health risks.*
- ***Terms related to price and promotion*** *(highlighted in green). Even when discussing healthy eating, consumers cannot avoid considering price and, in many cases, they associate the healthiness of a product with a higher-than-average cost. This places discount retailers at a disadvantage compared to traditional retailers. However, there is also a group of experts who argue that healthy spending can be achieved while staying mindful of the budget.*

Examining the sentiment associated with retailers provides valuable insights into some of the themes that emerged from the term cloud (Figure 4). The distribution of positive and negative opinions appears to be almost identical for all retailers, suggesting that sentiment toward retail brands is not influenced by the distinction between discount and non-discount stores. However, a more in-depth analysis of the positive sentiment associated with the examined retailers, along with a comparison of earned versus owned messages, reveals critical insights. Specifically, notable differences emerge in consumer perceptions of pricing and product healthiness, highlighting the nuanced ways in which users evaluate and engage with retail brands.

Figure 5 presents a summary of positive sentiment toward the retailer, distinguishing between general approval of the brand (light green line) and more specific expressions related to health, nutrition, and well-being (dark green line). This broader measure of positive sentiment captures not only direct appreciation for the retailer but also favorable opinions on its health-related products and services. Conversations focused on health, well-being, and nutrition significantly enhance positive sentiment, leading to an average increase of 16.8 percentage points.

The second chart on the right illustrates the distribution of messages based on their origin, distinguishing between official retailer communications shared through owned channels and externally generated content, such as user comments or reviews on third-party platforms (earned). When analyzed alongside the first chart, this distribution provides insight into how much of the observed positive sentiment originates from the retailer's direct communication versus external sources.

Fig. 5: Positive sentiment (retailers and topics) and total messages (earned and owned)

Source: our elaboration

The two graphs illustrate that positive sentiment toward brands, particularly regarding nutrition, wellness, and health, is largely driven by external (earned) sources. In other words, user-generated discussions play a key role in shaping positive perceptions, as consumers express favorable views on brands' offerings through their own content and conversations related to these topics, with the exception of a few specific cases. One notable exception is ***Discount 3****, which, despite having a relatively low volume of conversations (around 2,000), shows a remarkably high proportion of messages originating from owned sources, accounting for 51% (approximately 1,020 messages). This, combined with the fact that positive sentiment increases by 20 percentage points when nutrition-related topics are considered, suggests a strategic approach. Discount 3 appears to be investing in a marketing communication strategy centered on nutrition through its own channels, likely to enhance its reputation in areas such as health, healthy eating, and wellness. This initiative may be a deliberate response to the common perception that discount retailers offer fewer healthy product options (Völckner & Hofmann, 2007; Zielke, 2014).*

Retailer 4 *also stands out for its high volume of messages from owned sources (approximately 900), with a 29-percentage-point increase in positive sentiment when nutrition-related topics are considered. This suggests that, compared to other retailers, Retailer 4 is actively investing in nutrition marketing.*

This contrast underscores a significant opportunity for other retailers to enhance their online communication on healthy nutrition, particularly Retailer 1. ***Retailer 1*** *not only has a low positive sentiment but also shows a below-average increase of just 12 percentage points when nutrition topics are focused. Additionally, its engagement in nutrition marketing through owned channels is minimal, with only 70 messages.*

Research has shown that social influences play a key role in shaping healthier food choices (Cruwys et al., 2015; Kokkoris & Stavrova, 2021). By strengthening its online communication strategy and fostering discussions on nutrition, Retailer 1 could not only encourage healthier consumer behaviors but also generate positive word-of-mouth, ultimately enhancing its brand reputation (Schivinski & Dabrowski, 2014; Krisprimandoyo et al., 2024).

A final exception is ***Discount 1****, which, despite being widely discussed by users - in relation to health and nutrition, with 9,400 user-generated messages - sees only a 7-percentage-point increase in positive sentiment when these topics are considered. This figure is significantly below average, suggesting that Discount 1 does not have a strong reputation in the area of nutrition marketing.*

By integrating qualitative insights with quantitative data, it is possible to gain a deeper understanding of the observed results. First, although existing literature suggests that traditional retailers and discount stores are gradually converging in terms of reputation (Cardinali & Bellini, 2014; Anselmsson & Johansson, 2014), the findings do not fully support this claim. User perceptions indicate that traditional retailers are generally viewed as offering healthier products compared to discount stores. This perception of lower product healthiness in discount stores appears to be linked to price affordability - in other words, price levels are often used as a proxy for product quality and healthiness.

Despite social media testimonials from experts highlighting that a healthy diet is achievable even when shopping at discount stores - supported by their own purchase experiences - the widespread belief persists that low-cost food products may have a negative impact on health. Below are examples of expert content advocating for healthy eating while shopping at discount retailers.

Expert 1: *"Shopping with the nutritionist. What do I buy from discounters"*

Expert 2: *"WHAT do I buy and HOW MUCH do I spend per week at DISCOUNT for healthy, waste-free shopping? Find out by watching the video to the end!"*

This does not appear to have persuaded consumers, who instead demonstrate their mistrust of the quality and healthiness of cheaper products. The following online comments are illustrative of this:

User 1: *"Discount where convenience does NOT meet quality"*

User 2: *"Sorry, but you can't save on food"*

User 3: *"What you save at the discount store you use at the pharmacy later"*

User 4: *"If you go to the discount store you can't do the diet"*

In conclusion, traditional retailers appear to have a favorable reputation, as evidenced by the quantitative data (see Figure 5). However, a subsequent investigation revealed that this reputation is not uncontested, with negative comments relating to the quality and healthiness of the products that emerged when specific events occur, such as the recall of certain foods from the market.

User 5: *"Retailer 2 food warning, flagged up a product much loved by children"*

Although product recalls are rare, companies must respond transparently and promptly to preserve their reputation. In this case, recalling a popular children's product could be especially harmful due to customers' heightened sensitivity to food safety (see Figure 4). In order to prevent such incidents from undermining reputation, retailers should implement strict preventive measures and improve communication management during and after the recall in order to reassure consumers about product safety and quality. Figure 5 shows that retailers 2 handled the situation well, maintaining a good positive sentiment compared to the average of traditional and discount brands (+16 p.p.).

In the case of discount stores, such as Discount 1, there is a growing need to address topics related to health, well-being, and healthy eating in general. Focusing on the nutritional quality of the products offered could serve as a key

strategy to improve the retailer's perception, particularly if supported by clear and transparent communication about nutritional aspects. Increasing online presence and promoting healthy eating through effective communication could help enhance the overall brand image and reassure consumers about the nutritional quality of the products. However, as shown in Figure 5, Discount 1 still has significant work to do in terms of online nutritional communication through owned channels, as it remains limited (6%).

Research limitations. *While the study explores an interesting topic and enhances understanding of online communication by retailers in the areas of health and well-being, it is not without its limitations. The research is part of a larger project on nutrition marketing, representing only one phase of the overall study. Therefore, it could be further developed through the implementation of a longitudinal study to track fluctuations in reputation, as this can be influenced by transient events. Additionally, the study does not provide information on the demographic characteristics of the users, which could be an important aspect to monitor. Young people could perceive discount stores differently compared to adults due to varying economic availability (Thangavel et al., 2022) and, at the same time, they tend to be highly attentive to health and well-being issues (Becerra et al., 2023; Halicka et al., 2025).*

Managerial implications. *The study of online user conversations has provided an insightful overview of consumer perceptions regarding retailers and their image related to healthy eating and well-being. The results, on one hand, deepen the understanding of online communication in the retail sector, particularly regarding product healthiness, while, on the other hand, they offer significant managerial implications. First and foremost, there is a clear need for retailers to increase their online communication efforts on relevant topics, generating more content related to healthy eating, which is increasingly becoming a key aspect of brand recognition (Krisprimandoyo et a., 2024). This approach helps to shape user perceptions and guide conversations, directly communicating the retailer's commitment to nutrition issues, thereby improving positive sentiment. Secondly, in the case of negative comments, such as product recalls, it is crucial to act swiftly to address dissatisfaction, demonstrating transparency and care for the health and well-being of consumers. Timely interventions help prevent reputational damage, which can spread rapidly online. Finally, discount retailers, in particular, should focus on increasing their communication efforts, directing their editorial plans toward product healthiness and healthy eating. This would help challenge the widespread belief that low-cost equals unhealthy, ultimately enhancing their reputation. In conclusion, creating online content that highlights initiatives and offerings supporting healthy eating, well-being, and proper nutrition should be a priority for Italian retailers, who are still relatively passive and only partially attuned to consumer sensitivity on these issues.*

Originality of the paper. *Although the topics of proper nutrition, well-being, and the marketing of health-related products have been widely examined in the literature (e.g., Hecht et al., 2020; Scapin et al., 2025), much of the existing research relies on traditional methods such as surveys or interviews (e.g., Hwang & Chung, 2019), which may not fully capture consumers' spontaneous and authentic opinions on these on these socially relevant themes. In parallel, studies employing web listening or sentiment analysis typically focus on customer satisfaction, product features, or overall service quality (e.g., Lim et al., 2019; Radovilsky & Hegde, 2024; Falatouri et al., 2024), overlooking the broader discourse around retailers' engagement in promoting public health. This study aims to fill this gap by using web listening techniques to explore and highlight what users perceive regarding the grocery retail sector's efforts to support consumer health and well-being. The analysis of online conversations allows for a better understanding of the current alignment between the actions retailers are taking in promoting healthy eating and the perceptions of their audience. In this way, both traditional retailers and discount stores can reshape their communication strategies through their own channels, focusing more on a topic that resonates strongly with the public and contributes to shaping their reputation.*

Key words: *nutrition marketing; web listening; Italian grocery retailers; consumers' perceptions; well-being; health*

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Promoting Healthy Choices at the Point of Sale: The combined effect of Space Management and In-store Communication

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Abstract

The increase in chronic diseases is an alarming phenomenon, often linked to unhealthy lifestyles and diets. The relevance of this phenomenon in the retail sector is also recognised. Information overload can compromise consumers' ability to process information and make informed food choices. The arrangement of products on shelves has been demonstrated to influence consumers' information processing. In this regard, space allocation represents a powerful in-store marketing tool, given that the quantity and quality of space allocated to a product, category, or brand exerts a substantial impact on purchasing decisions. This study explores the effectiveness of a display aggregation of the cereal category, combined with in-store communication that leverages the taste attribute, to influence consumer choices. The experiment consists of a pre-test conducted through an online questionnaire on a sample of 246 participants. The results suggest that display aggregation combined with in-store communication can increases the choice of communicated products and reinforces the message conveyed by the in-store communication initiative. The study is not without its limitations, including the simulated online experimental setting and the composition of the sample. Further research could explore the effectiveness of combined strategies in real-world settings, involving a more diverse sample, by integrating the results with sales data.

Framing of the research. *The recent increase in cases of chronic diseases is an alarming phenomenon (GBD, 2018). This trend is also fostered by unhealthy lifestyles and diets (GBD, 2019). In this context, the importance of a preventive approach to health and well-being, through diet and lifestyle interventions, becomes evident. In this regard, the World Health Organization (WHO) emphasises the need to foster healthier food choices at the population level (WHO, 2022). The relevance of this phenomenon is also recognised in the retail sector; however, the wealth of information to which consumers are subjected can compromise the effective communication of health-related messages within the point of sale. Information overload has been demonstrated to impede an individual's capacity to make effective decisions (Toffler, 1970). Indeed, in situations of stimulus overload, the capacity for rational evaluation is reduced (Toffler, 1970). Previous studies (Jacoby et al., 1974; Jacoby, 1977) have demonstrated that information overload can lead to inefficient consumption decisions. While some studies report that consumers desire more information (Russo, 1974), others (Jacoby et al., 1974; Jacoby, 1977; Iyengar & Lepper, 2000) find that they make decisions when the number of choices increases, leading to potentially unsatisfactory choices. When consumers are faced with making a food choice, they have to consider a range of information. This process not only demands effort and time to acquire, but also effort to understand and combine this information into an overall evaluation (Russo, 1981). In consideration of the temporal and cognitive limitations experienced by consumers during the purchasing process (Hoyer, 1984), the arrangement of products on shelves has been demonstrated to exert influence on consumers' information processing (Lamberton & Diehl, 2013). In this context, space management is a powerful tool (Kim & Moon, 2021), which is strategically employed to influence consumer choices in a predictable manner (Pechey et al., 2020; Arno & Thomas, 2016), and prompting impulse buying (Sorensen, 2003). Through the strategic placement of products, retailers aim to optimise sales by leveraging factors such as the number of facing, assortment, and product availability. The extant literature (Dulsrud & Jacobsen, 2009; Chandon et al., 2009; Stilley et al. 2010) agrees on the importance of this lever, suggesting that the quantity and quality of the space dedicated to a product, category or brand are determining factors in purchasing decisions. Indeed, increased visibility, achieved through adequate exposure, has been demonstrated to increase the likelihood of purchase (Bayley & Nancarrow, 1998; Inman et al., 2009; Muruganantham & Bhakat, 2013; Wilson et al., 2016; Cadario & Chandon, 2017; Grandi et al., 2021). A substantial body of research has been dedicated to investigating the efficacy of various space management strategies over time. However, the findings have been somewhat inconclusive. For instance, Liu et al. (2018)*

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reported an increase in sales of healthy products when they were placed at the end of aisles; but when they placed less healthy and unhealthy products in the same aisles, sales of healthy products stopped increasing. In a study by Young et al. (2020), the placement of healthier breakfast cereals at eye level in three (and three control) supermarkets in New Zealand was tested, but revealed no significant difference in sales of the healthy products. Adam et al. (2017) conducted an experimental study on dairy products, managing the space in the refrigerated counters of ten Danish supermarkets; the study demonstrated that, although there was a significant effect for the individual products tested, there was no increase in overall sales of the category (Adam et al., 2017). de Wijk et al. (2016) conducted an experiment on wholemeal bread, placing it in a more "convenient" and accessible position, and found no difference in sales due to space manipulation. In contrast, in the study by Nakamura et al. (2014), the position of non-alcoholic and alcoholic beverages in the end of aisle produced an increase in sales (Nakamura et al., 2014). Baird et al. (2018) measured the quality of diet in women of childbearing age before and after a store layout intervention; this intervention consisted of increasing the availability and improving the positioning of fruit and vegetables, while removing sweets from the checkouts, giving positive results (Baird et al.,2018). In the research conducted by Trude et al. (2018), the strategic exploitation of space was achieved through the augmentation of access to sugar-free beverages and snacks. Concurrently, educational campaigns, promotional activities and communication initiatives were implemented, thereby culminating in the successful augmentation of sales of unsweetened beverages and the concurrent reduction in the percentage consumption of calories in snacks (Trude et al., 2018). It has been demonstrated in previous research (Van Kleef et al., 2012; Chandon & Wansink, 2007; Chapman et al., 2019; MacKenzie et al., 2019; Ayala et al., 2013) that the most effective strategy to stimulate healthier food choices is to integrate different nutritional marketing interventions and maximise their impact (Adam & Jensen, 2016). Therefore, we decided to test display aggregation in combination with an in-store communication initiative. Based on the above, we posit:

H1: Display aggregation increases the choice of communicated products.

In the context of food choices, consumer expectations regarding the taste of a product have been shown to influence decision-making processes (Saba et al., 2019) and to predict levels of food consumption (Roininen et al., 1999). In light of these findings, we decided to implement a communication strategy that would emphasise the taste attribute. However, when individuals are confronted with a choice, they often assume that opting for a healthy product necessitates compromising on taste, due to the prevailing belief that unhealthy food is more savoury than healthy food (Erhard et al., 2024; Raghunathan et al., 2006; Piqueras-Fiszman & Spence, 2015; Saba et al., 2019; Teisl & Levy, 1997). This phenomenon is referred to as the Unhealthy = Tasty Intuition (UTI) hypothesis (Mai & Hoffmann, 2015; Raghunathan et al., 2006). Nevertheless, research has demonstrated that consumer judgement can be influenced by shelf labelling that is capable of evoking taste expectations in the consumer's mind (Wansink, 2017) and that messages that emphasise the taste of a healthy product has the potential to change the consumer's perception towards it (Steptoe et al., 1995). Lugli (2015) has highlighted that the perception of a food's taste is influenced not only by the consumption experience itself, but also by the representation of that food. Therefore, we posit that:

H2: The aggregation of the display reinforces the message conveyed by the in-store communication initiative.

In order to implement an experiment in a real environment, a pre-test was first carried out with an online experimental design.

Purpose of the paper. *The present study aims to explore the effectiveness of display aggregation in the context of healthy product selection in the cereal category. The underlying assumption is that an organised and consistent arrangement of products can facilitate the perception of their availability and increase the likelihood of their selection by consumers. The research focuses on an experimental pre-test aimed at simulating shopping conditions and measuring the role that display aggregation plays in the decision-making process. The study also aims to examine whether display aggregation can strengthen the message conveyed through a taste communication initiative, reducing UTI perception. This research contributes to the extant debate in the literature on how space management can influence consumer choice, examining firstly the direct relationship between display aggregation and purchasing decisions; and secondly, the influence of the display on the message conveyed by in-store communication.*

Methodology. *In order to conduct the experiment in a real-world environment, an experimental design was conducted via a self-administered questionnaire on the Microsoft Forms platform as a pre-test. Participants were recruited via social networks during the period from 17 to 31 January 2025. The total sample consist in 246 individuals (70% female, 30% male). From a demographic perspective, the 19-34 age group constitutes the majority of the sample (57.72%), with the 45-64 age group representing a significant proportion at 28.05%. In contrast, the 35-44 (9.35%) and over-65 (4.88%) age groups are less represented. Within the 19-34 age group, 30.49% of respondents report purchasing health products for their psycho-physical well-being, while 19.51% do so to maintain or improve their physical fitness. Regarding educational attainment, 87.80% of respondents have attained a high school diploma or higher, while 12.20% have only completed a middle school diploma. With respect to employment status, 46.75% of respondents are employed by private companies, 18.29% are students, and 13.82% are self-employed. Geographically, the sample is predominantly concentrated in Northern Italy, with 60.57% of respondents residing in the North-West and 26.02% in the North-East.*

The southern and insular regions are less represented, with 6.91% and 1.63% of the sample, respectively. Two stimuli were presented to participants: (1) a video of the display aggregated with the taste communication initiative, (2) the display disaggregated with the taste communication initiative. The duration of the two videos was identical, as was their shelf-scrolling speed and simulated direction of travel. The products presented in the display were the same for both stimuli and had the same number of facing. The message communicated in the end-of-aisle crowner was as follows:

"TASTE is WELLBEING. A varied and balanced diet and a healthy lifestyle are the foundation of your well-being. Discover HERE for products that, due to their ingredients and nutritional values, can contribute to your well-being without sacrificing your desire for good food."

Meanwhile, the message presented in banner, floor sticker and stoppers a simplified version of the above, namely: "TASTE is WELLBEING". The product bundling strategy was implemented with the objective of promoting a range of private label cereals, which were selected in accordance with the retailer's specified nutritional criteria.

Results. *The analysis was conducted using IBM® SPSS® Statistics software. A multivariate ANCOVA was used to test our hypotheses. In addition to product choice, we measured other variables and included them as covariates. These are purchase intention, perceived product and shelf healthiness, perceived freedom of choice and shelf realism. With regard to H1, the means between the two groups were significantly different (Mdis = .38, Magg = .40; p = .020). Therefore, we confirm H1. Regarding H2, the means were again significantly different (Mdis = 5.11, Magg = 5.14; p = <.001). Therefore, we can accept H2. In addition, purchase intention (Mdis = 4.44, Magg = 4.73; p = <.001), perceived healthiness of the products (Mdis = 4.75, Magg = 4.78; p = <.001), perceived freedom of choice (Mdis = 4.9, Magg = 5.04; p = .075) were also significant in favour of the aggregated display. Instead, the realism of the shelf (Mdis = 4.82, Magg = 4.69; p = <.001) and the perceived healthiness of the shelf (Mdis = 3.97, Magg = 3.87; p = <.001) were higher in the disaggregated display. This could be due to the fact that consumers are not used to seeing an aggregated display in reality, making it less realistic. Furthermore, by aggregating healthy products, the number of less healthy products could be higher than in a disaggregated display, thus reducing perceived healthiness. These results suggest that an aggregated display with in-store communication based on taste can have a positive impact on influencing consumers' healthy choices.*

Research limitations. *The present study is subject to certain limitations that may have influenced the results obtained and offer insights for future research. Firstly, maybe the experimental context was not conducive to the desired outcome. In fact, although the simulated experimental context allows for greater control over the variables, it may not fully reflect real consumer behaviour in a real environment. Furthermore, the choice of using a video to represent the shopping experience may have reduced the emotional and cognitive involvement of the participants compared to an actual shopping experience. In reality, factors such as time pressure, stress level (Ahlbom et al., 2023), the presence of other shoppers (Hui & Bateson, 1991) and physical interaction with products influence the decision-making process. The absence of an effect of display aggregation on taste expectations suggests that the mere grouping of products is not sufficient to significantly alter consumer perceptions. It is possible that the communicative message focused on taste did not have a strong enough impact to change pre-existing expectations. Taste perception is a multifaceted construct influenced by numerous factors, including prior experiences, eating habits, and individual preferences (Montanari, 2006), which may have led to the non-significant change in expectations observed in this study. Another aspect that must be given due consideration is the spatial location of the display aggregation in the virtual display. Previous studies (Atalay et al., 2012; Valenzuela et al., 2013) have demonstrated that consumers tend to focus more upon products placed in the centre of the shelf. In our study, the display aggregation was placed on the left side, which may have had a negative influence upon the effectiveness of handling. This aspect deserves further investigation in order to assess whether a different spatial arrangement could more strongly influence consumer perception and choice. Moreover, the composition of the sample, may have influenced the results, limiting their generalisability. Online recruitment may be subject to self-selection based on specific interests and behaviours, potentially excluding less active social media users or those with different consumption habits. Finally, although the number of participants (N = 246) is adequate for many behavioural studies, a larger sample might provide more statistical power to detect any effects on display aggregation.*

Managerial implications. *The findings of this study provide certain insights for retailers. In particular, they show that aggregating products on the base of their nutritional quality can increase purchase intention and the perception of the healthiness of the products. This could consequently lead to an improvement in the nutritional quality of consumers' purchases. Working on the levers of space management and in-store communication is therefore essential for industry and distribution players. This study confirms the power of in-store marketing levers to influence consumer choice.*

Given the global problem of poor nutrition and the rise in cardiovascular disease due to obesity, this evidence is fundamental. It means that retailers have the power to improve people's lives through proper nutrition.

Originality of the paper. *The originality of this research lies in its ability to address some of the gaps in the literature on space management and point-of-sale communication by proposing an innovative approach that integrates product layout with a taste-focused message. The existing literature has explored the concept of information overload and its impact on consumption decisions (Toffler, 1970; Jacoby et al., 1974; Jacoby, 1977), highlighting how an excess of stimuli can impair consumers' decision-making ability. However, there has been limited investigation into how display space*

management can influence not only product choice, but also the perception of product quality characteristics, such as taste. The extant literature on the subject has predominantly focused on the role of space management in enhancing the visibility and likelihood of a product being purchased, albeit with equivocal results. For instance, while some research indicates that improved placement of healthy products can boost sales (Nakamura et al., 2014; Baird et al., 2018; Trude et al., 2018), other studies report no significant impact in this regard (Young et al., 2020; de Wijk et al., 2016). The present study contributes to the ongoing debate by testing the effectiveness of a display aggregation strategy combined with targeted communication to understand whether such an intervention can influence product choice and taste perception. Moreover, this study employs the UTI paradigm, which posits that consumers often perceive healthy products as less appetising than less healthy alternatives (Raghunathan et al., 2006; Mai & Hoffmann, 2015; Piqueras-Fiszman & Spence, 2015). The present study analyses the interaction between display and taste-focused communication, contributing to an understanding of how these two variables can influence purchase decisions and consumer perceptions. The findings of this study confirm the power of visual merchandising strategies, suggesting that combining multiple levers and multiple visual, perceptual and communicative aspects, may be necessary to achieve a significant impact on purchase decisions. In this sense, the study opens up new avenues of research on the combined effectiveness of different marketing levers at the point of sale, highlighting the need for further investigation to identify optimal display and communication strategies for healthy products.

Key words: *space management; nutrition marketing; taste communication; wellbeing; health; in-store marketing*

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The role of recovery strategies in online service failures: a cross-national study

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Abstract

This study proposes an integrative framework grounded in theories of justice and attribution theory to investigate how organizations delivering digital services can effectively respond to online service failures. Drawing on empirical data collected from Egypt and Spain, the research explores the effect of recovery strategies for e-failures on customers' post-recovery perceptions and behavior in the context of online banking services using Partial Least Squares Structural Equation Modeling. Cross-cultural variations in service recovery responses will be explored through multi-group analysis. The findings are expected to contribute to the refinement of online service recovery literature and provide actionable recommendations for online banking services aiming to tailor recovery processes in alignment with cultural expectations.

Keywords. *Service failure; Service recovery; Online banking; Justice Theory; Attribution Theory*

Framing of the research. *Service recovery is a crucial aspect of service management to contain the possible adverse effects of service failure, such as customer dissatisfaction, negative word of mouth, and customer defection (Zhao et al., 2025). Designing successful service recovery strategies can restore satisfaction, strengthen word-of-mouth and increase repurchase intentions (Jose and Mathew, 2016; Chao and Cheng, 2019).*

The recent shift towards digitalization of service across many sectors, including banking and financial services (Reis et al., 2019; Formisano et al., 2020), has increased the physical distance between service providers and customers, thus making it even more important for service providers to promptly react in case of service failure (Cunningham et al., 2005). Customers of online services can experience service failures (e-failures) due to different causes, including, for example, technological inefficiencies, delays, security issues, or poor customer support. These failures can undermine trust, making effective e-service recovery crucial for maintaining customer loyalty (Chih et al., 2012; Ozuem et al., 2017; Nyagadza et al., 2022). Failure in online banking services can be particularly critical since these services are usually characterized by a certain level of perceived risk and uncertainty (Cunningham et al., 2005).

In the event of an e-service failure, customers typically assess the situation by evaluating its controllability (i.e., if it was preventable), and stability (i.e., if the failure is likely to occur again). In addition, customers judge the perceived recovery justice, that is, whether the recovery effort was just/fair in terms of compensation, transparency, and the interpersonal treatment received from the service provider. Customers' reactions to service failure and recovery could vary according to different factors, including cultural dimensions (Gi Park et al., 2014). For example, extant research suggests that customers with a more collectivistic culture versus an individualistic culture may find it disturbing to complain in case of a service failure, and they would rather have the organization initiate service recovery actions (Lee et al. 2024). In this sense, cross-national studies are crucial to determining whether the established relationships between perceived recovery justice, post-recovery satisfaction, relationship quality, word-of-mouth, and repurchase intentions hold across diverse cultures and market environments (Tsao, 2018).

Purpose of the paper. *Based on these premises, this study combines Justice Theory (Rawls, 1971) and Attribution Theory (Weiner, 1985) with the aim of exploring the effect of service recovery strategies for e-failures in banking services on customers' post-recovery perceptions and behavior. Specifically, we will assess:*

1. *the effect of service recovery strategies on perceived recovery justice*
2. *the effect of perceived recovery justice on post-recovery satisfaction*
3. *the effect of post-recovery satisfaction on relationship quality*

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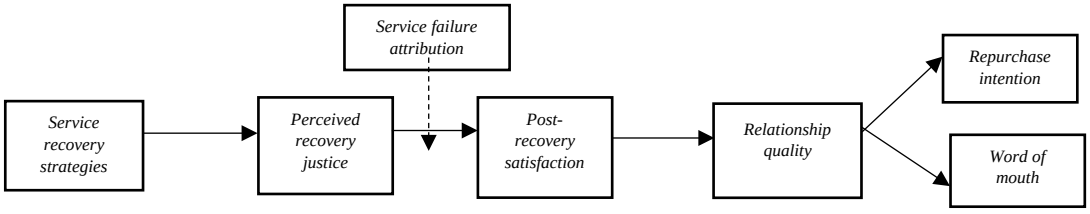
4. *the effect of relationship quality on attitudinal loyalty*
5. *the moderating role of service failure attribution in the relationship between perceived recovery justice and post-recovery satisfaction*

The model for the study is presented in Figure 1.

Fig. 1: The proposed model



Methodology. *This study will adopt a quantitative methodology. Two surveys will be conducted among a sample of Egyptian and Spanish customers of online banking services. The questionnaire will include items derived from previous studies that will be adapted to fit the study setting. Specifically, service recovery strategies will be measured with items from Liao (2007) and Boshoff (2005), while perceived recovery justice will be assessed through items adapted from Blodgett et al. (1997) and Maxham and Netemeyer (2002). Post-recovery satisfaction will be evaluated with items from Lin et al. (2011) and del Río-Lanza et al. (2009). Relationship quality will be measured with items adapted from Grégoire and Fisher (2008). Attitudinal loyalty will be assessed in terms of repurchase intentions (Zeithaml, 2000; Bacile et al., 2018) and word-of-mouth (Mattila, 2001; Wong and Sohal, 2002). Service failure attribution will be measured using items adapted from Hess et al. (2003). All items will be rated on a five-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5).*

For data collection, a web-based questionnaire will be distributed to banking customers in Egypt and Spain via social media. A purposive sampling method will be employed to ensure that participants have experienced online banking service failures and recovery, as verified through preliminary screening questions. To ensure content validity, the questionnaire will undergo expert review, will be piloted among customers from both countries, and will be translated using Brislin's (1970) method. The data will be analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) and multigroup analysis to explore differences between countries.

Results. *The data collection is still in progress at the time of writing this short paper. Across both Spain and Egypt, we expect to find a positive and significant effect of service recovery strategies on perceived recovery justice. In addition, we anticipate perceived recovery justice to increase post-satisfaction recovery, and, in turn, we expect post-satisfaction recovery will have a positive effect on relationship quality. Also, we anticipate that relationship quality will increase attitudinal loyalty. We expect service failure attribution to have a negative moderating effect on the relationship between perceived recovery justice and post-recovery satisfaction. Particularly, we expect to find that higher levels of service failure attribution will weaken the effect of perceived recovery justice on post-recovery satisfaction. We also expect to find significant differences between the two contexts of the analysis.*

Research limitations. *This empirical research will inevitably present certain limitations, which may shape directions for future inquiry. First, the empirical investigation will be limited to two countries. Future studies could extend the analysis to a more diverse range of regions.*

Second, the research design will adopt a cross-sectional approach, capturing user perceptions at a single moment in time. Longitudinal investigations may be warranted in future work to gain a more dynamic understanding of evolving customer experiences and behavioral trajectories.

Third, while the current framework will draw upon Justice and Attribution Theories, future scholars could explore alternative theoretical perspectives, such as Expectation-Disconfirmation Theory (Oliver, 1980) or Consumer Coping Theory (Lazarus, 1984), to further unpack the cognitive and emotional mechanisms underlying consumer reactions to service recovery efforts.

Fourth, reliance on self-reported survey data may introduce bias related to memory or social desirability. Incorporating objective behavioral data - such as service usage records or complaint logs from financial institutions - could enhance the empirical rigor and external validity of forthcoming studies.

Finally, the study will focus on digital service recovery within online banking services. Future research could investigate the implications of emerging technologies, such as AI-based support systems and chatbot interventions, in shaping customer judgments of fairness, satisfaction, and loyalty.

Originality of the paper. *This study will be poised to offer novel contributions to the academic discourse by generating original insights that will deepen the understanding of service recovery in the context of digital banking services. Departing from the traditional focus on recovery strategies in conventional banking environments, the research will redirect scholarly attention toward online service failures, an increasingly relevant domain as financial institutions pursue digital innovation, business model transformation, and operational redesign.*

The study will compare service recovery constructs across culturally distinct settings by employing a cross-national perspective. These findings will serve to extend and refine established theoretical frameworks, including Justice Theory and Attribution Theory, by illustrating how context can shape the efficacy of recovery strategies in diverse markets.

The study will also advance the literature by shifting the analytical lens from traditional recovery strategies to psychological service recovery dimensions. Empathy, explanations, quick response, and effective problem-solving will be examined as core drivers of customer perceptions. Furthermore, the research will integrate attributional variables - specifically stability and controllability - as subdimensions of service failure attribution. Recovery attribution will be introduced as a moderating factor in the relationship between perceived justice and post-recovery satisfaction.

Lastly, the research will uniquely position relationship quality as a central construct in predicting post-recovery behaviors such as repurchase intention and word-of-mouth advocacy, thus offering a complete understanding of the mechanisms that underpin sustained customer loyalty in digitally mediated service environments.

Managerial implications. *From a practical standpoint, this study will propose a set of strategic, adaptable recommendations aimed at helping online banking service providers navigate the complexities of digital service e-failures while strengthening customer relationships. Drawing on empirical insights, the research will outline best practices tailored to varying socio-cultural and institutional environments, offering practical guidance for implementation across both developed and emerging market contexts.*

It is anticipated that the findings will inform decision-makers in digital banking on how to refine their recovery approaches in response to culturally influenced customer expectations. For example, in some markets characterized by individualism and low-context communication (e.g., Spain), customers may prioritize transparency, detailed explanations, and formal accountability mechanisms. In contrast, in relationship-oriented, high-context cultures (e.g., Egypt), emotional intelligence, human interaction, and responsiveness may hold greater value in service recovery efforts (Lee et al. 2024).

Furthermore, the study is expected to reinforce the importance of relationship quality as a key driver of attitudinal loyalty, such as repeat usage and positive word-of-mouth. In culturally collectivist or trust-based environments, personalized services, such as loyalty programs, referral incentives, or regular follow-up communication, could significantly enhance customer retention (Westjohn et al., 2022; Honora et al., 2023).

The research will also highlight how perceptions of fairness in recovery vary: some customers may assess justice based on controllability (i.e., whether the issue could have been avoided), while others may judge service recovery on the speed and sincerity of the resolution. Therefore, rather than adopting a one-size-fits-all model, financial institutions will be encouraged to establish flexible recovery protocols that prioritize fairness, consistency, and promptness, cornerstones of customer satisfaction and long-term brand advocacy across digital service environments.

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The role of special events and AI in amusement parks to improve the customer experience and performance

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Abstract

This research explores the strategic role of special events in amusement parks, highlighting their impact on visitor experience and loyalty. With the growth of experiential tourism, parks have enhanced traditional attractions with themed events and engaging activities, becoming year-round destinations. The study uses a qualitative and quantitative approach, combining secondary data analysis and expert insights with surveys in Mirabilandia and online. The data analyzed through the Kano model assesses visitor satisfaction and the role of user-generated content in promoting events. The results show that while physical attractions remain central, special events significantly enhance the experience. Events such as Halloween extend the season, while digital marketing and artificial intelligence enhance customization. In terms of managerial implications, the study recommends leveraging special events and advanced technologies to improve visitor satisfaction, positively influence repeaters' rates and improve operational efficiency. The findings offer actionable insights to guide strategic decisions on special event offerings and the adoption of emerging technologies. The paper concludes with a discussion of the limitations of the analysis and potential directions for future research.

Framing of the research. *A positive customer experience represents a differentiation factor in the competitive positioning of organizations (Pine II and Gilmore, 1998; Meira de Vasconcelos et.al, 2013) and creates opportunities to improve the image and brand awareness. Today, customers are increasingly looking for experiences (Caru & Cova, 2003). In the tourism sector, memorable tourism experience has become central for companies to achieve important results in terms of their ability to better satisfy customers, attract new ones and strengthen their competitive advantage over time (Hosany et.al. 2022). Tourism experiences have been defined as enjoyable, memorable and engaging encounters (Oh et al., 2007). A recent report published by McKinsey & Company (2024) points out that offering experiences is a crucial factor in choosing a tourist destination. For the destination, creating opportunities for memorable tourism experiences is therefore beneficial for its competitiveness (Stone et. al, 2018). The travel experience market could exceed $1 trillion in value. Paid activities for tourists, such as concerts and entertainment, account for approximately 25% of global spending on experiences, totaling $250-310 billion per year. According to the Mastercard Economic Institute, the preference for experiences over material goods is growing. In Europe, the share of spending on experiences rose to 22% in 2023 (from 19% in 2019), while spending on goods remained stable. A Mastercard survey of over 16,000 consumers reveals that 88% plan to spend the same or more on experiences in 2024, with 33% interested in family experiences, such as amusement parks. Theme parks, water parks, zoos, and aquariums are a key sector in global tourism, with over 900 million tickets expected to be sold by 2025 and visitor spending reaching $66.33 billion (according to IAAPA[4]). In Italy, 180 parks attract 20 million visitors annually, generating over €350 million. The sector faces challenges related to costs and cultural competition, shifting the focus from creating new attractions to enhancing memorable experiences through events, shows and themed activities that can encourage both loyal guests and new visitors to increase the number of days spent at the park as well as to repeat the experience many times.*

Amusement parks are complex entities that require careful management to ensure sustainability and success. While they rely on key elements, they must continuously evolve to attract and retain visitors, adapting to trends and changes in the environment. Nowadays, capturing people's attention is increasingly difficult. The multitude of stimuli and the wide availability of diverse experiences create significant challenges in reaching and engaging the target audience. That's why amusement parks are increasingly transforming into hubs of various types of experiences: relying solely on physical attractions is no longer enough. There is a need to innovate, refresh, and focus on new engaging offerings such as special events, shows, themed parties, and much more. It is important to highlight that new technologies, particularly AI (but also AR/VR), contribute, and will further help, to create increasingly personalized and memorable experiences for different types of users and visitors. The impact is already significant and will lead to exciting developments in the coming years.

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Seasonality poses a challenge for amusement parks. As highlighted by the TEA/AECOM "Theme Index 2023" report, special events such as Halloween and Christmas help extend the season and attract new visitors. Today's parks aim is to offer unique experiences that combine existing attractions with thematic events with the aim of creating experiential and engaging opportunities for visitors even during the peak season. While events come with high costs, they are a powerful media tool for the Parks. Additionally, they improve the park's visibility through viral content on social media (often generated by visitors, also known as earned media) and collaborations with well-known external brands.

Based on these premises, the study aimed to understand the importance of special events in amusement park offerings (and strategies) as a means to build customer loyalty and spread the experience using social media by visitors. This communication tool is very effective in services, more than information spread through traditional communication channels (Hennig Thurau et al., 2010). The reason is the trust in the information shared by customers. Moreover, with social media the customers can share images and videos that can make the experience fully understood.

The research is based on theories of experiential marketing and services, with a focus on the economics of experience in tourism and amusement parks. To study the evolution of experiences in parks, market research techniques were extensively used, with a focus on guest satisfaction and an application of Kano's model to capture empirical data useful for analysis.

Purpose of the paper. *The objective of the paper is to understand how the offer is evolving within amusement parks, deep the importance of exclusive events and experiences over traditional entertainment formats, and how new technologies will create an even more disruptive impact.*

The research questions are the follows:

- *How is the experience evolving within amusement parks?*
- *How can events and exclusive experiences transform visitors into repeaters?*
- *What is the importance of events and exclusive experiences compared to traditional offering formats?*
- *How will new technologies impact the design of visitor experiences?*

Despite the growing interest of parks in organizing special events, there is a lack of detailed reports and specific analysis on the actual success of these initiatives, regarding visitor satisfaction levels and their impact on the park, in terms of e.g. economic results, visibility, notoriety, image and visitor's attraction. This information gap is the reason for this in-depth study on the evolution of the offer in amusement parks, with a specific focus on the strategic use of special events.

In this way it is possible to provide valuable insights that could be useful for professionals and operators in the sector in making strategic and operational decisions in the age of experience and digitalization and for future research. The paper concludes with some considerations about the role of AI in these entertainment venues: a highly relevant topic that impacts (and will continue to impact) every aspect of the park's value proposition.

Methodology. *This research takes a qualitative and quantitative approach to explore the role of special events in amusement park offerings, focusing on behavioural insights into visitor satisfaction, the likelihood of repeat visits and the potential of visitors to act as promoters through electronic word-of-mouth (eWom).*

The study was conducted as follows:

Exploratory phase: the initial phase involved an in-depth review of secondary data, including reports, academic literature, and insights provided by industry experts. This stage aimed to identify key variables and trends to shape the subsequent phases of the research.

Descriptive phase: primary data were collected using two structured questionnaires:

- ✓ *On-site survey: administered directly at Mirabilandia during the "Best Day Ever: Spongebob's Birthday" event organized in the season 2024;*
- ✓ *Online survey: conducted using a CAWI (Computer-Assisted Web Interviewing) method, yielding over 400 responses from a diverse sample of amusement park visitors.*

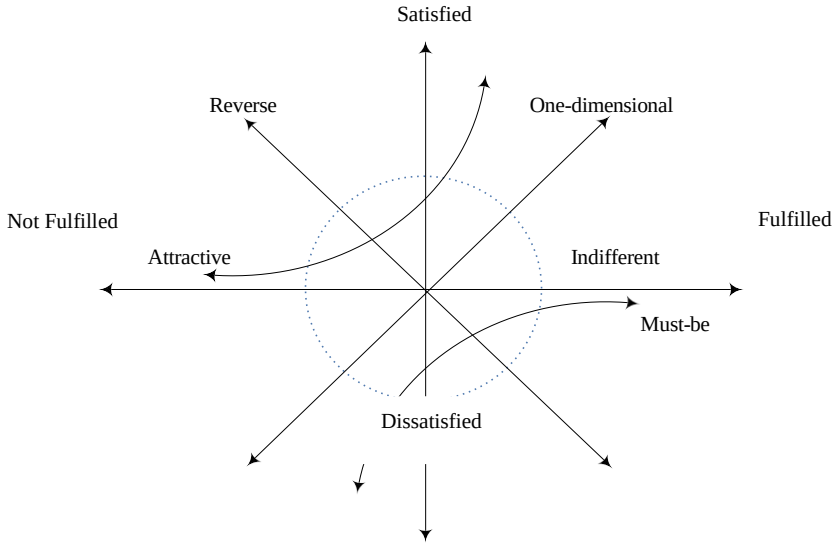
The collected data were analyzed using Kano methods and Net Promoter Score (NPS).

Kano model categorizes the attributes of special events based on their impact on visitor satisfaction. Kano model is an analytical tool defined by a professor at Tokyo Rika University, Noriaki Kano, in 1984. This model suggests that customer satisfaction is achieved when a customer's needs and expectations are met, and the products and services are categorized considering the customer's perceptions and the impacts on customer satisfaction. In this way it is possible to identify problems regarding the service quality level that need to be improved in order to increase customer satisfaction. The model involves asking customers the rate of satisfaction if the product or service has a particular attribute and if the product or service does not have some attribute. The following are suggested as response alternatives: I dislike it that way, I can live with it that way, I am neutral, it must be that way, and I like it that way (Kuo, 2012). Kano et al. classified quality attributes into five categories of must-be (basic), one-dimensional (performance), attractive (motivational), indifferent, and reverse (Kano et al., 1984; Llinares and Page, 2011; Shahin et al., 2013). The following are some considerations on the impact of these attributes on customer satisfaction (see fig.1):

- *Must-be Attributes: these are basic expectations. If they are not fulfilled, customers are dissatisfied but fulfilling them does not increase satisfaction;*

- *One-dimensional Attributes: satisfaction increases as performance improves, and dissatisfaction occurs if performance is poor;*
- *Attractive Attributes: these exceed customer expectations and create satisfaction when present, but their absence does not cause dissatisfaction;*
- *Indifferent Attributes: these have no significant effect on customer satisfaction, whether fulfilled or not;*
- *Reverse Attributes: these lead to dissatisfaction if fulfilled and satisfaction if not.*

Figure 1 Kano Model



Source: Adapted from Kano et.al (1984)

In this model there are therefore three types of product/service requirements that influence customer satisfaction in different ways depending on the level of satisfaction: must-be, one-dimensional, and attractive. The Kano model highlights how customer satisfaction depends not only on fulfilling explicit demands but also on unexpected factors that can positively surprise the customer and create the opportunity to exponentially increase satisfaction levels.

The second method used is the Net Promoter Score (NPS) to measure the likelihood of visitors recommending the park to others. The NPS is calculated using data obtained from customers who are asked to answer a single question: How likely are you to refer Company X to a friend or colleague? (Reichheld F. 2002).

The answer of each customer is collected as a rating on the 0-10 scale. Then customers are categorized into three groups according to the behaviour of their answers.

The first group is made up of those customers who have given a 9 or 10 score. They are very satisfied customers that share their experience with friends or other person using also social media. For this reason, they are the best friend of the company and are classified as Promoters. The second group is formed by customers who occupy a neutral position having provided an answer of 7 or 8. They received what they expected and that is why they are classified as "Neutral". The third and final group consists of customers who declare a disappointing score between 0 and 6. These customers are the detractors or those who have not been satisfied by the experience and do say negative things about the company and/or the product/service although they vary in terms of their own personality and attitude (Angelini, 2023). The net promoter score (NPS) is calculated by subtracting the percentage of detractors from the percentage of promoters, while the percentage of neutral is not used for the calculation (Hörsch, Rudinger, 2009).

Results. *The On-site survey conducted at Mirabilandia during one of the special events planned for the 2024 season: "Best Day Ever: Spongebob's Birthday" was carried out using CAPI (Computer-Assisted Personal Interviewing), with a total of 31 respondents (thus, a non-probability, convenience sample). More than half of the respondents (57%) stated that they had visited the park specifically for the event. Of these, 67% were families with children, the park's main target audience and the focus of the event. To evaluate the experience, 5-point Likert scales were used: 71% of respondents expressed satisfaction with the event (43% said "very satisfied"); 94% appreciated that the park offers this type of experience in addition to the classic physical attractions. The analysis was completed with the calculation of the NPS (Net Promoter Score): for this event, a score of 43% was recorded, which is in line with the park's average for similar initiatives.*

These early results suggest a strong appreciation for the special events organized in the park. In order to deepen the analysis, it was conducted an online survey (using the CAWI method) gathering opinions from over 400 amusement park visitors. Nearly half of the respondents were either season pass holders or frequent visitors, making them a well-qualified audience on the topic. The data were used to apply the Kano model. The aim was to identify the key requirements of

amusement park offerings to compare them and determine which of the previous categories they fall into: how special events, shows and mechanical attractions (the classic ones) are positioned in the minds of visitors?

The results are illustrated in the following tables:

Table 1: Special Events classification

SPECIAL EVENTS						
TOT	**A**	O	M	I	R	Q
402	**240**	49	1	104	6	2
100,00%	**59,70%**	12,19%	0,25%	25,87%	1,49%	0,50%

Source: Our elaboration

Table 2: Shows classification

SHOWS						
TOT	**A**	O	M	I	R	Q
402	**218**	105	4	75	0	0
100,00%	**54,23%**	26,12%	1,00%	18,66%	0,00%	0,00%

Source: Our elaboration

Table 3: Mechanical attractions classification

MECHANICAL ATTRACTIONS[5]						
TOT	A	**O**	M	I	R	Q
402	183	**179**	1	37	0	2

Source: Our elaboration

The data collected and processed leads to the conclusion that events and shows are positioned as attractive elements, while physical (or mechanical) attractions are classified as one-dimensional attributes.

Having made this distinction, the next step was to calculate the satisfaction/dissatisfaction coefficients. The following equations are used to calculate the two coefficients:

- *Satisfaction coefficient:*

$$\frac{A+O}{A+O+M+I}$$

- *Dissatisfaction coefficient:*

$$\frac{O+M}{(A+O+M+I) \times (-1)}$$

The satisfaction coefficient (realization of the offering element, first formula) ranges from 0 to 1, while the dissatisfaction coefficient (failure to realize the offering element, second formula) ranges from 0 to -1.

Regarding the satisfaction level, all three requirements have relatively high values close to 1. This means that the presence of these elements in the amusement park offerings contributes to increasing the respondents' satisfaction. It is noticeable that there is a particular "affection" for physical/mechanical attractions compared to other components of the offering. Even today, amusement parks are associated with adrenaline-pumping roller coasters, dark rides, and many people visit them for that reason. Events are seen as something that, if proposed, can contribute to increasing satisfaction and the overall experience in the park. However, they are not considered fundamental and necessary by the respondents: the negative value of the coefficient, equal to -0.13, suggests that their non-implementation does not lead to significant decreases in overall satisfaction. These considerations are understandable: this type of experiential offering is recent (for

[5] The assessment of attractions appears less clear: there is a substantial "tie" between requirement A (45.52%) and O (44.53%). In this case, the choice should follow the rule dictated by the model: if the requirements of a product/service cannot be uniquely assigned to the different categories of the Kano model, it is useful to apply the evaluation rule "M > O > A > I." Consequently, the introduction of new physical/mechanical attractions (or updates/improvements to existing ones) is classified as a "One-Dimensional" requirement.

example, in the case of Mirabilandia, they were introduced in 2023), and it will take a few years for visitors to "get used to" this component of the overall offering. Still, the positive impact, although not at the level of attractions, demonstrates the value of the initiative and justifies the investment strategies pursued by Italian parks in recent years.

Other data and insights from the questionnaire analysis reinforce the previous considerations. 64.64% of respondents who participated in at least one event (in recent years) stated that this type of entertainment had a decisive impact on their visit to the park. A general preference for themed events emerges (over 60% of preferences), specifically those organized for special occasions like Halloween. Visitors enjoy seeing the changing and adapting scenery, experiencing activities aligned with the mood of the celebration, and immersing themselves in meticulously designed settings.

An interesting aspect is the evaluation of satisfaction related to the latest experience at a special event: to solidify the metrics, 5-point Likert scales (ranging from "not at all" to "very much") and the NPS (Net Promoter Score) were used. Over 80% of respondents stated they were satisfied; nearly 50% (47.5%) said they "very much" appreciated the fact that the park offers these initiatives in addition to the classic attractions. Furthermore, almost 48.8% stated they would "definitely" return to the park for similar events. The NPS is at a positive value of 30% for the amusement park sector in general.

Social media play an increasingly important role in communication and user interaction. Data collected shows that the official social media profiles of amusement parks are the primary source of information (for 71% of respondents). Parks have not only recognized the importance of communicating through these platforms but also understand that they serve as a form of "free" advertising from visitors. Earned media have become essential for reaching new potential users, making it crucial to promote these behaviors and encourage participation.

During their last event experience, 50.2% of respondents stated that they shared it on social media. Among the platforms used, Instagram dominates with 83.6%, followed by Facebook at 61.8%. Stories are the most popular format (67.3%) for sharing park visits and event experiences.

Finally, it has been considered the influence of the AI in the visitors experience. Artificial intelligence is significantly transforming every sector of society; therefore, even complex organizations like amusement parks are impacted by this. As stated on IAAPA, the benefits of integrating AI are numerous: scalable content generation, real-time personalization of guest experiences, improved operational efficiency, visitor management optimization, customized itineraries, dynamic pricing, and real-time virtual assistance. The Six Flags park chain is implementing an innovative digital strategy with virtual assistants, an interactive mobile app, smart payments, and real-time image and video capture technologies. The use of wearable devices, like Disney's MagicBands and Universal's solutions, also enables a smoother experience by simplifying access to attractions and payments.

Figure 2 Disney Magic Band

Source 1 https://disneyconnect.com/

AI not only enhances experiences with immersive technologies like AR/VR and intelligent animatronics but also improves operational efficiency, reducing wait times and increasing guest satisfaction. Data analysis can also be optimized with AI to enhance the visitor experience at every stage of the customer journey. Strategies like dynamic pricing, intelligent queue and service management, and effective digital communication are increasingly appreciated by customers. Groups like Disney and Merlin use big data to optimize flows, resources, and offers, while parks like Bobbejaanland leverage connectivity to monitor and improve services in real time. New technologies are also improving safety in amusement parks. For example, Disney uses a surveillance system with closed-circuit cameras and machine learning to analyze visitor behaviors and identify dangerous situations, thus reducing risks. Additionally, AI can monitor the operation of rides, anticipate failures, and suggest maintenance, making a significant impact on safety.

However, it is essential to balance innovation with human warmth: contact with operators and personalized assistance remain central. The challenge is to leverage technology without losing the essence of what makes amusement parks places of joy and human connection.

Managerial implications. *The insights from this study provide valuable suggestions for amusement park operators and industry professionals, highlighting key strategies to enhance visitor experiences and maintain or reinforce competitiveness.*

While physical attractions remain the cornerstone of amusement parks, the rising importance of special events underscores the need to integrate them as a central part of the offering. Operators should focus on creating synergistic experiences where events complement existing attractions to amplify visitor satisfaction. Moreover, this strategic orientation can serve as a distinctive and strategic component to increase visitation frequency and enrich the overall visitor experience. By designing immersive and thematic events, parks can create memorable experiences that visitors are eager to revisit the park and recommend the experience using electronic word of mouth (eWom).

The integration of amusement parks, artificial intelligence, and new technologies is revolutionizing the visitor experience. Data-driven marketing optimized with AI enables the creation of personalized experiences, highlighting how investment in customer analytics is more strategic than simply adding new attractions. AI enhances resource management, improves operational efficiency, while IoT devices enrich interaction and the guest experience. AR/VR will also play an important role in creating immersive experiences within the parks. Artificial Intelligence and advanced technologies offer new opportunities for growth, so it's very important to be prepared for future trends. The continued evolution of amusement parks lies in their ability to innovate. Operators should monitor emerging technologies and trends to stay ahead of industry shifts, ensuring the integration of cutting-edge solutions that enhance both the visitor experience and operational performance.

In conclusion, this research reaffirms the central role of amusement parks in leisure activities. By embracing innovation, enhancing creativity, and investing in experiential and technological advancements, parks can secure their position as key players in the entertainment, tourism, and broader leisure industries.

Originality of the paper. *This research contributes to the existing literature on amusement parks by addressing an underexplored aspect of their offering: the growing strategic importance of special events. Unlike previous studies, which have primarily focused on physical attractions as the main drivers of visitor satisfaction, this study highlights the evolving role of themed and seasonal events in enhancing the visitor experience.*

The use of a dual-method approach-on-site surveys and online questionnaires-allowed for a comprehensive analysis of visitor perceptions, combining direct feedback with broader audience insights. Additionally, the application of the Kano model to evaluate visitor satisfaction with special events represents a novel methodological contribution in this context.

Another original element lies in the exploration of artificial intelligence (AI) as a transformative tool for the amusement park industry. While existing studies have examined AI in broader tourism settings, this research specifically links AI's potential to operational efficiencies, personalized experiences, and the design of innovative event offerings in amusement parks.

By combining these elements, the study not only provides actionable insights for industry practitioners but also advances academic understanding of the interplay between traditional attractions, special events, and emerging technologies in the entertainment sector.

Research limitations. *This study acknowledges several limitations. First of all, the data were collected from a non-probabilistic sample, which limits the ability to generalize the conclusions to the entire population of amusement park visitors in Italy. Furthermore, some questionnaires included incomplete responses, particularly for optional questions. This may have contributed to discrepancies in respondent counts and minor gaps in the analysis. Moreover two optional questions regarding event-related merchandising received limited responses. As a result, this variable, while recognized as relevant and potentially significant, was not included in the final analysis. Future studies could explore this aspect further to provide a more comprehensive understanding of visitor behaviors and preferences. Finally, the influence of AI in the visitor experience needs to be appropriately deepened and complemented by conducting an ad-hoc analysis. In the paper, only a few considerations on the developments and applications of AI in the context of amusement parks have been reported, but which hint at interesting effects on the visitor experience.*

These limitations underline the need for future research with a probabilistic sampling approach, broader geographical coverage, and additional data collection on key variables like merchandising to enhance the robustness and applicability of the findings.

Keywords: *Amusement parks; Special events; Visitor experience; Customer loyalty; Kano model; Artificial Intelligence (AI)*

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An empirical study on the perception of AI-generated online reviews among university students

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Framing of the research. *The use of Artificial Intelligence (AI) technologies has revolutionized and reshaped content creation practices in various sectors, transforming the way information is produced and evaluated in digital environments. More specifically, e-commerce platforms like Amazon increasingly incorporate AI-generated reviews to automate feedback, manage product recommendations, and shape consumer behavior. Other industries, including the hospitality sector, may benefit from the potential of AI-generated content to enhance marketing effectiveness.*

In the hospitality context, online reviews represent a critical decision-making feature that, when perceived as trustworthy, can serve as an influential source of information that can significantly impact booking intentions (Filieri et al., 2016). Consumers, in particular, use feedback from previous users to reduce uncertainty in the purchase decision process. Prior research has extensively documented the importance of reviews in consumer decision-making (Sparks & Browning, 2011) and the role of different types of reviews, from traditional word of mouth, typically based on oral communication, to electronic word of mouth (eWOM), its web-based evolution (Hennig-Thurau et al., 2004; Liu & Park, 2015). Nevertheless, limited attention has been paid to how consumers respond to AI-generated reviews compared to human-written ones, especially when disclosure about content origin is provided or withheld. Based on this background, the present study specifically focuses on the role of the so-called "word of machine" (Longoni & Cian, 2022), a new form of recommendation driven by AI, which serves as an alternative to traditional word of mouth and eWOM. Longoni and Cian (2022) found that AI chatbots can increase an individual's purchase intention in the context of search products, while the opposite occurs for experience products. In contrast, Lo Presti et al. (2021) suggested that AI chatbots can positively influence purchase intentions for experience products by enhancing customer engagement and satisfaction. As research in this area is still emerging, further investigation is needed to clarify these aspects and provide more definitive insights. More specifically, a deeper exploration is needed to compare human and AI-generated recommendations and their distinct effects on consumer decision-making. AI-based recommendations, along with other advanced technologies, can be used not only to simplify the decision-making process but also to enhance customer engagement, facilitate communication, and personalize the guest experience (Chauhan et al., 2022). In particular, as large language models, such as ChatGPT, continue to advance in generating high-quality text, hotels are now presented with new opportunities to leverage AI to create review content that may supplement or enhance traditional user-generated reviews. From a broader perspective, how consumers and AI interact has opened new lines of research, highlighting the need for innovative, cross-disciplinary theoretical frameworks and methodological approaches (Pentina et al., 2023).

Another important issue in research on AI-generated content concerns disclosure. Preliminary studies suggest that informing consumers about AI authorship may influence how the content is evaluated (Jakesch et al., 2019). As a result, the disclosure of AI involvement seems to play a crucial role in shaping consumer trust, acceptance, and decision-making. To date, however, examining the effects of disclosure in this framework is limited. Particularly, despite growing interest in AI applications within the hospitality sector (Abrate & Faralla, 2024), a significant research gap remains in the understanding of how consumers respond to AI-generated reviews, particularly when disclosure is provided or withheld, and how AI-generated content may influence purchase intentions about traditional user-generated content. Moreover, age may influence how consumers perceive and respond to AI-generated content, as younger and older users may differ in terms of familiarity with technology, trust in automation, and cognitive processing styles (Guerra-Tamez et al., 2004).

This study aims to address these gaps by comparing eWOM and AI-based recommendations through a survey experiment involving different treatment conditions. Specifically, the study compares AI-generated online reviews-with and without disclosure-with a condition featuring real (human) online reviews, using a sample of university students.

Purpose of the paper. *The present study, based on an experimental analysis, investigates how consumers respond to AI-generated hotel reviews compared to online human-written reviews, with particular attention to the effects of disclosing the AI-generated nature of the contents on purchase intentions.*

Using a three-treatment experimental design, we examine whether consumers' purchase intentions differ when exposed to an AI-generated review without disclosure, an AI-generated review with disclosure, or real (human) reviews.

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As a preliminary finding, the study also explores how different consumer segments-particularly digital natives and non-digital natives-respond to AI-generated content.

This research aims to provide hospitality managers with evidence-based insights into the strategic value of AI-generated content as part of their digital marketing strategies. More specifically, the study aims to assess the potential benefits and best practices for integrating artificial intelligence tools, such as ChatGPT, into analysing reviews within hotel management and customer relationship practices within the hospitality industry.

Methodology. *The design of the experiment comprises three treatments. In Treatment 1 and 2, participants were displayed the image of a hypothetical hotel room (Figure 1) in which a textual review and a rating were provided.*

The textual review corresponds to a textual (summary) review generated by Artificial Intelligence, namely ChatGPT. To produce this summary, ChatGPT was provided with 10 textual reviews of a hotel from Booking.com and instructed to generate a concise summary within a 400-character limit. The selected summary was drawn from a dataset of 40 ChatGPT-generated summaries originally created for a separate study. To create that dataset, ten customer reviews and respective ratings were selected for 20 three- and 20 four-star hotels. Half of the hotels were in Rome and the other half in London. We chose Rome and London because they are prominent cities, and we wanted to evaluate ChatGPT recommendations for Italian, our mother language, and English, a global language. To ensure consistency and relevance, the selection process for these reviews incorporates a predefined set of criteria. For Rome, we selected the hotels based on top choices and focused on the most recent reviews in Italian. For London, we selected the hotels based on top choices and focused on the most recent reviews written in the English language. Given that the reviews on Booking.com include both a positive and negative textbox, we selected cases where the reviewer filled in both positive and negative comments. Hotels with insufficient reviews were excluded from the database. Among these 40 reviews, for the present experiment, we chose the one which (1) seemed to be as realistic as possible, (2) had a high rating, and (3) was in Italian since this is the mother language of the experimental subjects in this study.

As for the numerical review, we used the average rating (from 1 to 10) of the original 10 textual reviews provided by the ten customers on Booking.com. As a result, in Treatment 1 and 2, the textual review is provided by ChatGPT, whereas the numerical review is the average rating of real (human) customers.

In Treatment 2, subjects were specifically informed that the textual review was generated by ChatGPT, while in Treatment 1, we did not provide this information. This is the only difference between the two treatments.

Finally, in Treatment 3, the subjects faced the same hypothetical hotel room and numerical review as in Treatment 1 and 2; nevertheless, they were presented with the 10 real (human) customers' reviews instead of the summary review from ChatGPT.

In all treatments, at the same time as the image was presented, the participants were asked the following questions: (1) the intention to buy the hotel room (i.e., How likely are you to choose to stay overnight at this hotel?; 11-point Likert scale from 0 = not at all likely to 10 = extremely likely; Juster, 1966); (2) level of trust in the textual review associated with the hotel room (11-point Likert scale from 0 = not at all to 10 = very much); (3) the level of trust in the rating assigned with the hotel room (11-point Likert scale from 0 = not at all to 10 = very much).

Following this section, the experiment comprised two additional parts. First, subjects were asked about general attitudes towards reviews: trust and usefulness of textual and numerical reviews in hotels but also generally for goods and services (flights, restaurants, etc.; 11-point Likert scale), how much they rely on reviews in their decision to buy (11-point Likert scale), and if they also write often reviews (11-point Likert scale) and for what type of good and services (open question). They were also asked to report the means of booking a hotel among hotel websites, online booking sites, travel search engines, traditional travel agencies, telephone reservations, or others. The final section included socio-demographics (i.e., age, gender, educational level, and employment status).

A follow-up section was ultimately assigned to some participants who were available to complete it. The follow-up section was available only for Treatments 1 and 2, focusing on participants' perceptions of using AI for reviews. However, we asked subjects in Treatment 3 if they remembered the intention to buy assigned to the hotel room at the beginning of the experiment. This was for assessing the different cognitive load during the experiment, considering that in Treatment 3, they had 10 instead of one review to process. The same question was also asked in Treatment 2, as a control, to assess whether it similarly increased cognitive load compared to Treatment 3.

As for the follow-up section (Treatment 1 and 2), we asked for general impressions of using ChatGPT for processing real (human) hotel reviews and for goods and services reviews (open questions) as well as the level of trust and the perception of usefulness they have about ChatGPT-generated content (11-point Likert scale). They were also surveyed about if they ever thought or tried using ChatGPT for reviews in the past (Yes, I have thought about and tried; Yes, I have thought about, but not tried; No, neither thought nor tried).

Finally, in Treatment 1, we also disclosed that the textual review was generated using AI, particularly ChatGPT. Considering this information, we asked to answer the questions in the first section again: the intention to buy the hotel room and the level of trust in the textual and numerical review associated with the hotel room. We also asked how they feel about this information (i.e., disclosure of AI use; more positive, neutral, or negative feeling) and if they realized it was an AI-generated review (no, more no than yes, more yes than no, yes).

Before starting the questionnaire, participants in all treatments were presented with a disclaimer outlining the questionnaire and privacy policy. Once they accepted the disclaimer, they proceeded to the experiment.

The present paper focuses on purchase intention and levels of trust in the textual review and rating associated with the hotel room in the different treatments, as well as the role of disclosing that the textual review was generated using AI

and participants' socio-demographic characteristics. Therefore, we restrict our analysis to this part of the experiment in the following sections.

*For this study, we used data from an online survey conducted among the students at an Italian University in the North of Italy. The questionnaire was distributed by using Qualtrics XM (https://www.qualtrics.com). Respondents received an invitation to participate via email using the communication office newsletter. The survey remained open from October 24 to November 22, 2024. One reminder email to the survey invitation was sent approximately after two weeks. The questionnaire was completely anonymous, and participation was entirely voluntary. The total number of subjects that completed the questionnaire was 413 (68% female, mean age = 25.44 years, SD = 9.46). A priori power analysis, conducted with G*Power (Faul et al., 2007), revealed that a sample of 115 participants per group was sufficient to detect a medium effect size and a minimum of 95% statistical power for a Wilcoxon-Mann-Whitney test with the use of Bonferroni's correction.*

A detailed description of each treatment is provided in Table 1. Treatment 1 (No Initial Disclosure Provided) included 150 participants, whereas Treatment 2 (Initial Disclosure Provided) consisted of 145 participants and Treatment 3 (Human Reviews) had 118 participants. The gender composition and average age of each treatment group aligned with the overall sample characteristics.

Fig. 1: Hypothetical hotel room presented to participants

Source: Photo by [Lotus Design N Print](https://https://unsplash.com/@lotusdnp). Accessed June 6, 2024.

Tab. 1: Overview of Treatment Conditions

Treatment	***Description***
Treatment 1 - No Initial Disclosure Provided	*Please consider the following hotel, for which the average rating (on a scale of 1 to 10, where 1 represents the lowest and 10 the highest) and a representative review are provided.* *[hotel room] 8.70* *The hotel offers a truly exceptional stay, thanks to its quiet location and attentive staff. The rooms are well-appointed and comfortable, though some could benefit from minor upgrades. Breakfast is varied and plentiful, served with care in a cozy setting. The only area for improvement is the Wi-Fi connection, which could be more stable and faster.*
Treatment 2 - Initial Disclosure Provided	*Please consider the following hotel, for which the average rating (on a scale of 1 to 10, where 1 represents the lowest and 10 the highest) and a representative review are provided. The textual review was processed through ChatGPT based on a summary of 10 real (human) reviews.* *[ChatGPT is an Artificial Intelligence model designed to understand and generate natural language text, answering questions, providing explanations, and performing various conversational or language processing tasks. Artificial Intelligence is a computer science discipline that develops systems and algorithms capable of performing tasks typically reserved for human intelligence, such as image recognition, language understanding, problem solving and autonomous learning].* *[hotel room] 8.70* *The hotel offers a truly exceptional stay, thanks to its quiet location and attentive staff. The rooms are well-appointed and comfortable, though some could benefit from minor upgrades. Breakfast is varied and plentiful, served with care in a cozy setting. The only area for improvement is the Wi-Fi connection, which could be more stable and faster.*
Treatment 3 - Human reviews	*Please consider the following hotel, for which the average rating (on a scale of 1 to 10, where 1 represents the lowest and 10 the highest) and a representative review are provided.* *[hotel room] 8.70*

	1. *Location surrounded by greenery and a delicious, varied breakfast. Friendly and always available staff. There were minor technical issues with the Wi-Fi, which didn't work very well, probably due to the high number of guests at the property. But nothing serious!* 2. *We stayed at this property because we were working remotely. The wonderful garden became our office for a few days. The staff, always smiling, managed to meet every request without any problem. The villa is stunning, and every detail is impeccably taken care of. The bar/reception is beautifully furnished, and we fell in love with it instantly. I would probably add mosquito screens to the rooms, as being on the ground floor near a garden makes it easy to encounter a few mosquitoes. We had the room with the whirlpool tub, but while filling it, we realized there was a boiler, as after a few minutes, the hot water ran out, and we had to wait for it to heat up again. The Wi-Fi was a bit unstable.* 3. *I liked everything: the caring and welcoming staff, the beautiful room, and the super comfortable bed, which is the most important thing. And then the breakfast-the best I've had in any hotel I've stayed at. Perhaps the lack of hot water in the shower in the morning was an issue, but it was summer, so it wasn't a big problem.* 4. *Definitely worth considering for a stay that makes visiting this beautiful city pleasant. The location is unique-very beautiful and quiet, relatively close to the centre. Unfortunately, public transportation was lacking, especially in this hot summer with the metro out of service. Consider other means of transport for easier movement. Breakfast meets every need, with the staff always available and welcoming. I was disappointed not to find the classic croissants to accompany coffee or cappuccino. But, as I mentioned, it meets all other needs.* 5. *Perfect location, excellent breakfast. Great reception, location, and room space! Breakfast is well-prepared.The breakfast service cannot start at 8:00 AM; 7:30 AM should be the minimum, and ideally 7:00 AM for those who are not on vacation.* 6. *Courteous and helpful staff, along with the meticulous environment. An annoying issue with the price at check-in. I booked at one rate, but later I was informed there was an error and that I could either pay €38 more or accept a refund.* 7. *I liked the location and the room, but there was no hot water.* 8. *Great hotel with a garden. Very abundant breakfast with high-quality products, served in a clean, elegant, and convivial setting. The room is very beautiful and recently renovated. The villa and the surrounding garden are gorgeous and allow guests to enjoy a lovely day in the greenery, with benches, tables, and chairs set up all around. The staff is very available and kind. This is not a negative comment, just a note about the breakfast time, which currently starts at 8:00 AM. Considering there could also be guests who are not necessarily tourists but workers, it should be anticipated to at least 7:30 AM to allow them to reach their destinations on time. The staff did offer to prepare a takeaway breakfast box, but generally, the pleasure of having breakfast in such a setting would be preferable to a box.* 9. *Warm welcome and very kind staff. A property with great character, tastefully decorated and with attention to the smallest details, from the courtesy set to the crockery (order tea to verify). Enchanting garden. I stayed in the room near the reception, but some hotel guests talked very loudly late into the night, making it difficult to sleep.* 10. *Beautiful location in a very quiet residential area. Spacious and nicely decorated room. It feels like being at home. Good breakfast, but above all, served with care. The Wi-Fi connection needs improvement.*

Results. *As noted earlier, the present study focuses on purchase intention and trust in the hotel room's textual review and rating, with particular attention to the impact of disclosing that the review was AI-generated and participants' socio-demographic characteristics.*

Participants' purchase intention resulted to be higher for Treatment 1 (mean = 7.45, SD = 1.68, median = 8) and Treatment 2 (mean = 7.19, SD = 1.88, median = 8) than for Treatment 3 (mean = 6.71, SD = 1.99, median = 7). As for trust in ChatGPT's textual and rating reviews, the results were the following:

- *Trust in ChatGPT's textual reviews: Treatment 1 (mean = 6.85, SD = 1.62, median = 7), Treatment 2 (mean = 6.63, SD = 2.01, median = 7), and Treatment 3 (mean = 7.14, SD = 1.75, median = 8);*
- *Trust in ChatGPT's rating reviews: Treatment 1 (mean = 7.03, SD = 1.64, median = 7), Treatment 2 (mean = 6.86, SD = 1.90, median = 8), and Treatment 3 (mean = 6.55, SD = 1.92, median = 7).*

Regarding purchase intention, the comparison between Treatment 1 and Treatment 3 was statistically significant ($p < .01$; Mann-Whitney U test with Bonferroni correction applied), whereas the other pairwise comparisons were not significant, with mean values being very similar across those conditions. Comparisons for trust in ChatGPT's textual reviews and trust in ChatGPT-generated ratings were also not significant, indicating no substantial differences in trust levels across the different treatments.

Focusing on the main variable, participants' intention to buy, the significant difference between Treatment 1 (ChatGPT-generated reviews without disclosure) and Treatment 3 (human reviews) suggests that participants responded more positively to AI-generated content when unaware of its source. At the same time, however, disclosure seems to act as a credibility signal: transparency regarding AI authorship (which is supposed to enhance credibility) partially offsets any potential intrinsic preference for human reviews, and the difference between the two treatments (i.e., Treatment 2 and 3) is not significant. In parallel, participants did not appear to significantly devalue content solely based on the knowledge that it was AI-generated (and, indeed, Treatment 1 and 2 did not significantly differ in purchase intention). As a result, AI-generated content seems more persuasive than human content, and disclosure intervenes only slightly in this advantage.

In Treatment 1, we disclosed that the textual review had been generated using ChatGPT in the follow-up questionnaire, where participants were again asked about their purchase intention and their level of trust in both the

textual and numerical reviews associated with the initially presented hotel room. All mean values decreased when participants were informed that ChatGPT generated the review. More specifically, the mean value of the intention to buy lowered from 7.45 (SD = 1.68; median = 8) to 6.13 (SD = 2.31; median = 7), trust in ChatGPT's textual reviews switched from 6.85 (SD = 1.62; median = 7) to 5.72 (SD = 2.37; median = 6), and, finally, trust in ChatGPT's rating reviews dropped from 7.03 (SD = 1.64; median = 7) to 5.87 (SD = 2.33; median = 6).

All comparisons conducted before and after the disclosure were statistically significant: $p < .001$ for purchase intention and trust in the numerical rating, and $p < .01$ for trust in the textual review (Mann-Whitney U test with Bonferroni correction applied). It is also worth noting that participants reported limited use of ChatGPT in their daily lives, with a mean score of only 3.45 on a scale from 0 to 10. Additionally, only 3 out of 150 participants reported realizing that the review was AI-generated.

As for socio-demographics, we examined the potential effects of gender and age. For gender, no statistically significant differences were found in purchase intention. To analyse age-related effects, participants were categorized as digital natives (N = 303) or digital immigrants (N = 110) to assess potential differences in responses. We classified Generation Z participants as digital natives, considering individuals born from 1997 onward, although recognizing that definitions of generational cohorts can differ across the literature. Although non-digital natives represent only one-third of the Gen Z participants, we can draw some preliminary insights from the comparison. In particular, the mean purchase intention is lower across all treatments for non-digital natives (Treatment 1: mean = 6.21, SD = 2.42, median = 7; Treatment 2: mean = 6.07, SD = 2.30, median = 7; Treatment 3: mean = 6.00, SD = 2.51, median = 7). Additionally, the differences between treatment conditions were not statistically significant for this group of participants. For the digital native group, by contrast, mean purchase intentions were: 7.81 (SD = 1.18; median = 8), in Treatment 1, 7.64 (SD = 1.46; median = 8), in Treatment 2, and 7.00 (SD = 1.67; median = 7), in Treatment 3. This group's comparisons between treatments involving ChatGPT-generated reviews and the human review condition were statistically significant ($p < .01$ for Treatment 1 vs. Treatment 2, and $p < .05$ for Treatment 2 vs. Treatment 3). However, the comparison between the two AI-generated review treatments was not significant, with mean values being very similar across those conditions. Although this finding should be further investigated with a larger sample, it seems to suggest that digital immigrants appear less sensitive to differences between review sources, showing relatively stable purchase intention across treatments.

Research limitations. *Some limitations of the present study should be acknowledged, as they offer important avenues for future research. First, the sample consisted exclusively of university students, which limits the generalizability of the findings to the broader population, particularly older age groups. Additionally, the sample was not gender-balanced, with 68% of participants identifying as female, which may have influenced the results and limited the generalizability of the findings. For instance, skepticism toward AI-generated content or emotional responses to numerical and textual reviews may vary between consumers of different genders. The distribution between digital natives and non-digital natives was also uneven, with non-digital natives representing only about one-third of the sample, making it difficult to draw robust conclusions about age-related differences in responses. We intend to replicate and extend these findings in future research using more representative and demographically balanced samples, ideally including participants across a broader range of ages, education levels, and digital literacy. This would allow for a more comprehensive understanding of how different population segments perceive and respond to AI-generated content in online review contexts. A future treatment using ChatGPT-generated content with multiple reviews, comparable to the human review condition, should be tested to examine whether review quantity affects participants' perceptions and decisions-particularly in light of the dual-system approach, which distinguishes between intuitive, heuristic processing and more deliberate, analytical reasoning. Future research should also consider potential ethical and privacy risks associated with using AI technologies in consumer contexts.*

Managerial implications. *The findings of this study offer several implications for managers in the hospitality and broader e-commerce sectors. First, AI may offer a powerful tool for hotel managers to identify trends and patterns in guest preferences, enabling data-driven decisions to enhance guest satisfaction and overall business performance. AI's real-time processing of large-scale review data is essential for timely operational adjustments. The lack of significant differences in trust across treatments suggests that participants did not perceive AI-generated reviews as substantially less trustworthy than human ones. Despite this may offer reassurance to managers aiming to incorporate AI-generated summaries or ratings into their platforms, ethical considerations around transparency must be balanced carefully with strategic goals, as full disclosure-provided in a second step rather than immediately-significantly diminished participants' purchase intention and trust. Managers should therefore carefully consider how and when to disclose the use of AI-generated content, potentially framing it in a way that emphasizes accuracy and efficiency to mitigate skepticism and increase transparency, as such disclosure may affect the overall perceived credibility.*

Additionally, the different attitudes between digital and non-digital natives highlight the importance of audience segmentation in the framework of AI-generated online reviews. Younger consumers-such as digital immigrants-seem more sensitive to AI-generated reviews, reporting lower purchase intention, which may necessitate targeted communication strategies.

From a practical perspective, these insights can help hotels refine their service offerings, respond proactively to guest feedback, and tailor marketing strategies to specific customer segments. Through AI's ability to evaluate guest sentiment in real time, hotels can identify and address negative experiences while continuously adapting their services to meet

evolving customer expectations. Moreover, managers may consider complementing average numerical ratings with concise textual summaries generated by AI through comprehensive content analysis of real (human) reviews. This approach can help clarify the distinct roles that numerical and textual elements play in shaping consumer perceptions of AI-generated reviews, with and without disclosure.

Regarding theoretical implications, the findings suggest that consumers may process AI-generated content differently from human-generated content, carrying broader implications for information processing theory. Moreover, by empirically engaging with the emerging concept of "word of machine", this study further highlights AI-generated recommendations as a distinct form of influence-one that may warrant its theoretical framework within the domains of communication and consumer behavior.

Finally, concerning the Sustainable Development Goals (SDGs), this study contributes to a better understanding of how AI technologies can be effectively integrated into service industries (SDG 9 - Industry, Innovation and Infrastructure). Moreover, the focus on disclosure and transparency in AI-generated content may align with promoting informed and ethical consumer choices (SDG 12 - Responsible Consumption and Production).

Originality of the paper. *The present study offers a contribution to the growing field of human-AI interaction by experimentally examining how AI-generated reviews generated by ChatGPT can influence consumer preferences within an online hotel booking scenario under different disclosure conditions. With regulatory bodies placing greater emphasis on transparency through the disclosure of AI-generated content, the current research provides empirical evidence about the impact of such disclosures on consumer behavior. Additionally, by incorporating the distinction between digital natives and non-digital natives, the study provides some preliminary insights into how consumers perceive and respond to AI in decision-making contexts. Furthermore, in terms of hospitality management, hotels and accommodation providers may benefit from using AI-generated review content as part of their marketing strategy, even with appropriate disclosure, suggesting that a hybrid approach-combining guest experiences with optimized AI-generated content-may yield better results in the digital marketing of the hospitality sector. Moreover, the investigation of how consumers respond to AI-generated content could be extended to other products and e-commerce platforms.*

Keywords: *Artificial Intelligence; ChatGPT; online reviews; textual review; rating; hospitality sector*

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The dimensions of the hospitality experience quality in the long-term care organizations: preliminary empirical results[1]

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Abstract

This study explores how hospitality experience quality is created in Long-Term Care Organizations (LTCOs), where older adults seek not only clinical care but meaningful, emotionally rich experiences. Through a qualitative research method based on a survey conducted through interviews with LTCO managers of the Veneto Region in Italy, eight key dimensions emerged: clinical quality, physical environment, food quality, interaction quality, immersion, participation, fun, and surprise. These dimensions contribute to bridging the gap between healthcare and hospitality literature and align with the UN's Sustainable Development Goal 3, promoting well-being for all ages. It represents one of the first efforts to define and explore hospitality experience quality in LTCOs. Managers are encouraged to cultivate an organizational culture beyond operational efficiency, integrating experiential elements into daily care.

Framing of the research. *The growth in the older population is leading to a wider demand for specific types of healthcare service settings, such as long-term care organizations (LTCOs), namely facilities dedicated to the ongoing care of individuals with chronic healthcare or social care needs, such as assisted living residences, nursing homes, and hospices. In the LTCOs, senior customers - who are individuals 65 years old and older - do not seek only services but also experience. Offering only services is not enough to create human well-being in LTCOs, and investing in service quality is considered implicit, namely, it is mainly taken for granted.*

The first studies on service quality - which is traditionally defined as a comparison of customer perceptions with expectations of actual service performance (Lewis, 1989) - date to the late seventies of the last century (e.g., Gummesson, 1979; Grönross, 1982; Parasuraman et al., 1985). In the healthcare setting, this concept is widely investigated (e.g., Cavallone et al., 2017; Singh and Prasher, 2019; Pekkaya et al., 2019) through several models (e.g., Choi et al., 2005; Duggirala et al., 2008; Sumaedi et al., 2016) and concerning specific themes such as costs of quality management systems (Wagner et al., 2003), services organization and delivery (Riedel et al., 2016), and some aspects of the patient experience (e.g., Manary et al., 2013).

Past research ignores the elements that affect experience quality, which are becoming crucial to enhancing the appeal of the LTCOs. The initial studies conducted in the healthcare setting have distinguished "what" patients receive during healthcare services from "how" they receive the service delivery (Collier, 1994). In this regard, the technical performance of practitioners has been identified as clinical quality ("what"), while their interpersonal performance, i.e., customization of care fitted to the unique needs and values of the patient, has been named as experiential quality ("how"). Aligned with this initial concept (Donabedian, 1980) is the next research according to which experience quality results from customer's perceptions and evaluations of interactions that occur during the provision of care and treatment (Li and Benton, 1996; Chandrasekaran et al., 2012; Ponsignon et al., 2015).

Taking inspiration from other service industries connected to healthcare in terms of service quality and customer experience, such as tourism and hospitality sectors, experiential quality is deeply tied to the uniqueness of customer experiences, which are individually and subjectively constructed in each person's mind. In this sense, it is impossible to replicate it identically across individuals (Schmitt, 1999). It encompasses "not only the attributes provided by a supplier,

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but also the attributes brought to the opportunity by the visitor" (Crompton and Love, 1995, p. 12). As such, experiential quality is shaped by the customer's emotional and psychological responses rather than being solely based on functional or utilitarian aspects (Chen and Chen, 2010). There are very few studies on experience quality from a healthcare management perspective (Raleigh et al., 2012; Ponsignon et al., 2015).

The models proposed in the literature are not exhaustive because they cannot catch all the dimensions of the experience quality due to their context dependency. Unlike this limitation, from the studies conducted over the past 30 years, experiential quality emerges as a multidimensional construct whose dimensions vary depending on the context of the service under investigation. The dimensions that define experiential quality across different service settings are multiple, as illustrated in Table 1, which highlights a selection of studies conducted in various service contexts.

Although patients would live their hospitalization in LTCOs that provide them with a comfortable environment such as feeling at home, hospitality emerges as one of the under-researched dimensions: hospitality involves integrating hotel-like services into care settings to address not only patients' clinical needs but also their emotional and social well-being (Suess and Mody, 2018).

Given that no studies have specifically investigated hospitality experience quality, the following question is posed: What creates hospitality experience quality within LTCOs?

Tab. 1: The dimensions of the hospitality experience quality

Dimensions	***Study settings***	***Examples of studies***
Hedonics, peace of mind, involvement, and recognition	*Hotels, airlines, tours and attractions*	*Otto and Ritchie (1996)*
Entertainment, education, and community	*Zoos*	*Cole and Scott (2004)*
Programs, amenities, and entertainment	*Festivals*	*Cole and Chancellor (2008)*
Interaction quality, physical environment quality, and outcome quality	*Cultural tourism*	*de Rojas and Camarero (2008)*
Immersion, participation, fun, and surprise	*Theme parks / Water parks Restaurants*	*Kao et al. (2008) / Jin et al. (2015) Wu et al. (2021)*
Hedonism of product category, involvement, product complexity, and relationality	*Automotive, brewery, transport and catering*	*Lemke et al. (2011)*
Cleanliness, communication consistency, patient involvement in decision-making, the information provided, confidence in staff, dignity, and respect	*Healthcare*	*Raleigh et al. (2012)*
Interaction quality, physical environment quality, outcome quality, and access quality	*Heritage tourism*	*Wu and Li (2017) Wu et al. (2018)*

Purpose of the paper. *This study aims to answer this research question by adopting the service provider perspective. It especially identifies the dimensions of hospitality experience quality provided by LTCOs to their guests.*

Methodology. *Given the explorative nature of this research, this study adopts a qualitative method as a research design strategy. The choice of conducting an exploratory study is suitable for the purposes of this research because it enables researchers to examine a specific and complex phenomenon in its real-life context (Yin, 2017) and address emerging topics for which existing theories and frameworks may not fully explain the phenomenon under investigation (Creswell and Poth, 2016).*

A purposive sampling approach was used to select respondents who could provide an informed "insider" view. This sampling method includes carefully selecting LTCOs that meet specific criteria (e.g., number of patients, provided services, existence of instruments for satisfaction measurement). A contact list was developed precisely by considering the importance of including an adequate variety of cases. LTCOs' managers of the Veneto Region (Italy) were contacted and requested to complete an email survey. The email contained a cover letter about the purpose of this study. It aimed to gather their availability to participate in this research and indicate the relevant staff contacted to provide opinions and comments about how they contribute to delivering hospitality experience quality.

In-depth interviews were chosen because they give informants freedom and flexibility to communicate their ideas, beliefs, and experiences in their own words and use storytelling to converse relaxedly (Creswell and Creswell, 2018). The interview guide was designed based on the literature review. The two following topics constitute the interview's core: service quality and experience quality. To gather a comprehensive range of information, the general topics mentioned were formulated in an open-ended question format (Gioia et al., 2013). The interviews were conducted vis à vis or via Google Meet or Zoom between September and November 2024. Each meeting lasted approximately 40 minutes to 1 hour. Following the approach outlined by Hogg et al. (2014), Italian-language interviews were translated into English.

Only managers interested in participating in the study were considered eligible targets. Precisely, interviews with eight managers of LTCOs were undertaken. In qualitative research, a fixed number of interviews that ensure the effectiveness of the sample size does not exist. Considering that the theoretical saturation can be reached between six and eight participants (Kuzel, 1992), the sample of this study can be considered adequate to respond to the research question. The anonymity and confidentiality of their responses were guaranteed.

The interviews were analyzed using NVivo software and reported in three stages outlined by Gioia et al. (2013), i.e., the first-order categories, second-order themes, and aggregate dimensions. Precisely, the first-order categories meticulously capture the details exhibited during the interviews with LTCOs. The second-order themes aggregate similar

concepts found in the first-order categories. Finally, subsets of the second-order themes are gathered into theoretical aggregate dimensions.

The researchers adopted a blended approach, inductively identifying the themes from the data and, subsequently, deductively framing these themes within the frameworks proposed by scholars who examined the experience quality dimensions in various service contexts.

Results. *The managers of the LTCOs interviewed for this study emphasized different elements that were gathered into the eight following dimensions of hospitality experience quality: clinical quality, physical environment quality, food quality, interaction quality, immersion, participation, fun, and surprise (Figure 1), which are explicated in the following subsections. Some illustrative quotations are proposed as empirical evidence to support the research findings.*

Clinical quality

The first dimension of the hospitality experience quality that managers highlighted is the medical treatment quality, which comprises multiple service activities such as clinical accuracy with appropriate diagnoses and correct medication use, continuity of care with close coordination among doctors, nurses, therapists, and external specialists, advanced care planning with the involvement of residents and families in healthcare decisions, pain and comfort management, and individualized care. All these services impact the hospitality experience quality by increasing trust, safety, a sense of control, and humanization of care and reducing stress and anxiety for residents and families. In brief, this dimension refers not only to the medical treatment quality provided within the facilities but also to the relational approach, timeliness, and accessibility offered.

Physical environment quality

The managers of the LTCOs considered for this study outlined that their guests consider the quality of the physical environment as not merely a "background" element but an active component of the lived experience in those facilities. A well-designed space can enhance autonomy, foster relationships, evoke well-being, reduce patient stress, and provide a sense of control and familiarity. For example, wide corridors, non-slip flooring, elevator access, and assistive devices within the facilities are not just elements of the physical environment that improve accessibility and mobility. They also enhance the residents' sense of safety and autonomy. In this regard, the two following statements gathered during different interviews are significant:

> *"The possibility for residents to personalize their room with personal items reinforces their identity and allows them to create a sense of home."*
> *"The size of the bedroom, the available space, the bathroom, and the view from the window are all factors that significantly influence residents' perceptions of their living environment."*

Food quality

All the interviewees have reported that food quality in their LTCOs is very important for all guests. It refers to their perception of the overall quality of meals, which creates experience in sensorial (taste, smell, appearance, temperature, and texture), cognitive (biographical history and personal food culture), and behavioral/relational (conviviality and comfort) terms. This respondent outlined this aspect with these words:

> *"Most of our guests look forward to the moment of the meal because it makes them happy and carefree, offering a sense of routine, comfort, and the opportunity to connect with others in a warm and familiar setting."*

Interaction quality

Another dimension is interaction quality, which refers to the perceived quality of everyday interactions among residents, staff, family members, and volunteers. It can transform a care service into a truly emotional and human experience. For this reason, it encompasses not only courtesy and professionalism but also deep human elements such as empathy, active listening, communicative skills, the ability to build trust, and recognition of each person's uniqueness, as this respondent stated:

> *"Every gesture, word, or silence of our staff can become care and recognition."*

Immersion

The managers interviewed highlighted the importance of providing their guests with opportunities for immersion by designing meaningful activities that enable them to foster engagement, also through multiple senses such as touch, smell, taste, and hearing, evoke autobiographical memories, stimulate conversation and social interaction, reduce the perception of "empty time", and improve both cognitive and emotional well-being. In this regard, each LTCO offers different activities such as occupational therapy, parties, creative workshops, film clubs, musical moments, or guided walks, as these respondents said:

> *"We organize activities that are casual but lively. For example, on holidays, we organize parties that leave a positive feeling in our guests for days."*
> *"Our guests perceive time spent in various activities as full and meaningful."*

Participation

According to the interviewees, the guests of different LTCOs are actively involved in daily decisions to reduce their passivity, stimulate self-determination, and increase empowerment and respect for dignity. In this regard, they participate in meal choices, and many of them co-design the weekly schedule of different recreational activities, as this respondent explained:

> *"Regularly, we organize meetings with schools or scout groups to involve our guests in socialization moments, games, readings, or workshops, which enable them to share their skills with younger participants, favoring intergenerational knowledge transfer and stimulating their emotions."*

Fun

The interviewees declared that fun is a fundamental dimension to creating a well-being climate in their LTCOs because it takes on therapeutic value, given that the days of their guests are often characterized by medical routines, which afflict and sometimes bring suffering. Especially playful, musical, theatrical, or interactive activities stimulate positive emotions and, at the same time, reduce depression and improve mood, as the extract from this interview outlines:

> *"When we organize festive evenings involving families and staff, our guests can enjoy themselves, relive memories, share joyful moments in a playful atmosphere, strengthen relationships with fellow residents and caregivers, and reduce stress."*

Surprise

The results collected during the interviews highlighted that guests of LTCOs appreciate unexpected moments that break the routine and stimulate curiosity because they create "delight moments" that become lasting memories, strengthen episodic memory, and serve as a cognitive reactivation function, as these respondents told:

> *"When we bought two donkeys, which are housed in the large garden of our facility, our guests were amazed at the possibility of interacting with those animals. Everyday, they go to feed them and stay in their company as if it were their first time."*
>
> *"Once a week, without prior notice, an animal-assisted therapy educator arrives with dogs or cats to interact with the residents, generating unexpected emotions, sensory and emotional stimulation, and many memories."*

Fig. 1: The dimensions of the hospitality experience quality in long-term care organizations

Research limitations. *This preliminary study presents several limitations that may influence future research. First, the analysis is limited to a reduced sample of LTCOs, which may restrict the generalizability of the findings. Consequently, it would be interesting to expand the sample to other LTCOs and include more managers and staff members within each organization to offer more comprehensive insights. Collecting a more expansive and different range of perspectives could provide a broader conceptualization of the hospitality experience quality.*

Second, the LTCOs selected for the empirical research are all located in Italy, especially in only one Italian Region, namely the Veneto. Future research could incorporate more LTCOs from diverse national geographic areas to capture whether variations exist in providing hospitality experience quality. In addition, future research could replicate the study

by extending the analysis to other countries. The results could reveal interesting similarities or disparities in hospitality experience quality design, providing deeper insights into its dimensions within the LTCO setting.

Third, this study focused exclusively on the perspective of service providers. However, previous research (Voss et al., 2008) emphasizes the importance of comparing the planned experience with the realized experience perceived by customers. While this study considered only the design and delivery of the experience from the provider's side, future research should also examine the customers' perspective, which may not align with the planned experience. Understanding the customer viewpoint could offer valuable insights for improving the quality of the hospitality experience. In this context, the service recipients can be seen as a "collective customer" by incorporating not only the patients or clients themselves but also their carers, including family members and friends.

Finally, the present research adopted a qualitative approach. Future research could conduct a quantitative survey using a structured questionnaire. This would allow for the development of a managerial model to design and manage hospitality experience quality in LTCOs. Such a model should adopt an integrated perspective involving multiple stakeholders who contribute to enabling seniors to maintain a lifestyle aligned with principles of human well-being.

Managerial implications. *This study highlighted that the managers of the LTCOs interviewed are concerned not only with the technical performance of care and reduction of operational costs but also with the shape of residents' perceptions of quality and experience within their facilities.*

The findings suggest that hospitality experience quality can be effectively developed when supported by an organizational culture that values not only efficiency but also prioritizes residents' well-being. This involves embracing a more holistic, resident-centered approach, where different hospitality experience quality dimensions must be integrated into daily care practices.

The opportunity offered by this research to explore real-life examples from LTCOs enables managers to derive valuable recommendations for enhancing hospitality experience quality within their facilities and promoting overall human well-being. From a practical standpoint, the findings of this study suggest that LTCOs should prioritize investment in food quality, not only from a nutritional perspective but also as a key moment for emotional satisfaction and social interaction. In addition, they advise strengthening service quality, emphasizing clinical quality to ensure safety, personalization, and continuity of care, the quality of the physical environment, and interaction quality by fostering empathy, active listening, and meaningful human relationships between staff, residents, and families. Finally, this research recommends designing and implementing experiential activities that go beyond basic care, encouraging immersion with deep engagement in meaningful tasks, participation with active involvement and decision-making of guests, fun by offering moments of play, laughter, and levity, and surprise with unexpected, delightful experiences that break the routine. These combined elements support the transformation of LTC environments into emotionally rich, person-centered spaces where residents experience care and, simultaneously, a meaningful daily life.

Originality of the paper. *This research emphasized the importance of creating greater awareness among LTCO managers about developing hospitality experience quality and identifying the key dimensions that contribute to ensuring a great quality of life for the seniors within these facilities. In this regard, this study represents one of the first attempts to explore and define the concept of hospitality experience quality within the context of LTCOs. Traditionally, customer experience (e.g., Knutson et al., 2006; Kim et al., 2012) and experience quality (e.g., Voss et al., 2008) have been primarily examined in the tourism and hospitality sectors. Precisely, customer experience refers to the customer's responses following the interaction with the physical environment and relational elements (e.g., employees) during service delivery (e.g., Sampson, 2012) and elements that fall outside the provider's control (Verhoef et al., 2009) such as attitudes and behaviors of fellow customers. Differently, experience quality is defined as a perceived judgment about the excellence or superiority of the customer experience (Lemke et al., 2011). Therefore, experience quality is a broader concept than service quality, encapsulating a wider range of dimensions.*

This study can be fully integrated into the 17 Sustainable Development Goals proposed by the 2030 Agenda of the United Nations in 2015, especially Goal 3 (Ensure healthy lives and promote well-being for all ages). It outlined how LTCOs, which are a specific type of healthcare service setting that requires further research on hospitality experience quality, can respond to the increasing demand from the aging population by offering not only clinical care but also a hospitality dimension that supports seniors in maintaining a lifestyle aligned with human well-being.

Keywords: *long-term care organizations; residential services; service quality; experience quality; hospitality management; well-being*

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Track 9
Small & Family Business

Preliminary Findings on Knowledge Transfer in Family Firms: Insights from Family Communication Patterns Theory

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Abstract

Knowledge transfer is crucial for the success and innovation of family firms. This study reviews existing literature on the topic through the lens of Family Communication Patterns (FCP) Theory, an aspect that remains underexplored. It examines how different communication styles within families influence the transmission of both tacit and explicit knowledge across generations. This review contributes to the literature on family business governance and organizational learning by integrating insights from communication studies. Future research should empirically assess how FCP Theory can enhance knowledge transfer strategies, ensuring business continuity and competitive advantage in family firms.

Framing of the research. *According to several literature contributions, approximately 30% of family businesses manage to endure into the second generation (Ramadani, Bexheti, Rexhepi, Ratten, & Ibraimi, 2017), while roughly 16% persist into the third generation. Consequently, succession emerges as one of the most challenging and pivotal choices for family enterprises (Ramadani and Hoy, 2015), in fact the improper management of succession planning is the primary cause of failure for family business (De Massis et al., 2018).*

Knowledge transfer from the founder to the successor might be problematic, but it is crucial for an effective succession process and achieving family business longevity (Pham et al., 2019).

There is a significant gap in the literature regarding this topic, studies focus more on the relationship between the learning process of individual family members and the entrepreneurship orientation, rather than on the methods of transmission and its content.

According to the literature on the subject, there is no one standard definition of knowledge. This work shares the knowledge's definition of Tsoukas and Vladimirou (2001) who describes knowledge as person's ability to draw distinctions: "Knowledge is the individual ability to draw distinc-tions, within a collective domain of action, based on an appreciation of context or theory, or both."; individuals decide upon the meaning they apply to the particular context. Here comes the ability to see the difference and draw distinctions.

Language and meaning plays a crucial role in knowledge construction, language is traditionally seen as a communication tool consisting of words in order to be able to describe reality and its objects (Renzl, 2007).

The transfer of tacit or explicit knowledge, or family wisdom, through the enterprise is crucial for its survival and development for the benefit of future generations (Trevinyo-Rodríguez & Tàpies, 2010).

Differently from non-family businesses, the most important factor, influencing the process of knowledge transfer lies in the reliability of the knowledge source itself; experiments in the field of communication have shown that a reliable source can significantly influence a recipient's behavior (Szulanski et al. 2004).

Furthermore, family business owners are inclined to teach next generations members everything they know about the business, since their main dream is that their kids continue it and build on it; in fact knowledge transfer through entrepreneurship education provides important awareness relative to entrepreneurial education as well as self-efficacy. Additionally, it makes a substantial difference during the business succession process (Li & Wu, 2019; Vamvaka et al., 2020).

In this sense, empirical findings indicate that children are more likely to develop entrepreneurial behaviors if they grow up with parents who are entrepreneurs, learning from their parents' entrepreneurial experiences, and internalizing their behaviors as norms for their own (Schmitt- Rodermund 2004); however, the content of communications between parents and children has been largely ignored (Dou et al., 2020).

We cannot study the process of knowledge transfer within family firms without analyzing the concept of family. The perspective applied from this work, suggest us to define the family as a social system (Parke et al., 2006). The family is conceptualized as a social system with its own characteristics, rules, roles, communication patterns and power structures that go beyond the individual. Furthermore, in this social systems framework, a family consists of subsystems such as parent-child, sibling, marital and co-parent subsystems. Family members are considered interdependent and influence each other and other subsystems directly and indirectly (e.g., a child may indirectly influence the couple by directly

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influencing the behavior of one of the parents). The interactions between family members are also considered transactional (Kuczynki, 2003). That is, the interactions between parent and child are bidirectional rather than unidirectional and causality is circular rather than linear. Furthermore, the family microsystem is seen as embedded in larger systems, and interactions take place within and between these different levels (Cox and Paley, 1997).

Purpose of the paper. *The aim of this study is to analyze knowledge transfer in family firms, in particular the role of communication between the family's members and the knowledge transfer process. To examine the phenomenon, we apply the perspective of Family Communication Patterns Theory (Fitzpatrick et al., 1994), a general theory of family communication that focuses on parent-child communication to create a shared social reality. It identifies basic processes of establishing a shared agreement that affect not only concurrent communication behavior but also long-term information processing and psychosocial and behavioral outcomes. It claims to describe what family communication is and how it works, rather than how it might be interpreted in a particular context or what it should be based on a particular ideological perspective (Braithwaite et al., 2017).*

The issue of the communication process between family members plays a strategic role, in fact it would be possible to define an effective model of knowledge transmission, thus increasing not only the absorptive capacity of successors, but contributing to a definition of tacit and explicit knowledge.

Family Communication Patterns Theory, describes specific ways in which family members interact and communicate. According to the theory, family communication varies across two dimensions: conversation and conformity.

1. *Conversation dimension: this dimension reflects the extent to which family members engage in open and frequent communication. Families with high conversation orientation encourage open dialogue, while those with low conversation orientation may prioritize privacy.*
2. *Conformity dimension: this dimension pertains to the degree of conformity and adherence to family norms and values. Families with high conformity orientation emphasize uniformity and compliance, whereas those with low conformity orientation allow for individual expression (Koerner & Fitzpatrick, 1997).*

Based on the combination of conversation and conformity orientations, the theory identifies four family types:

1. *Consensual Families: High conversation and high conformity. These families encourage open communication while maintaining strong norms.*
2. *Pluralistic Families: High conversation and low conformity. They value individual expression and open dialogue.*
3. *Protective Families: Low conversation and high conformity. Privacy and adherence to norms are emphasized.*
4. *Laissez-Faire Families: Low conversation and low conformity. These families have minimal communication and few norms.*

Different types of family communication patterns have also been linked to different parenting styles, such as authoritarian, permissive, or authoritative. It has been discovered that authoritative parenting and discourse, and positive communication in particular, are related. This approach is being strict and setting boundaries while still being kind and encouraging to kids.

Conversely, the conformity orientation, which is frequently seen negatively, has been connected to both authoritarian parenting (being exigent with affection) and permissive parenting (being warm and not strict). (Hamon & Schrodt, 2012).

Management scholars concur that proficient communication plays a crucial role in various work- related behaviors and results, including team efficiency, conflict resolution, and company success. However, there is still limited understanding related to the influences that shape the communication styles of employees, managers, and business owners in the work environment.

The communication style that leaders bring to boards of directors and top management teams were imprinted from their families during youth, this topic should be explored in order to understand how and how much these communication processes impact on the company's performance and on the real skills of entrepreneurs.

Several studies suggest that a climate of supportiveness and open communication in the family helps cultivate some important personality characteristics, such as self-esteem and sociability, that individuals use to cope with different and difficult circumstances. Although the impact of family communication styles on the development of personality traits may not appear as obvious as the behavioral effects, the influence process is long-term and subtle. More importantly, the outcome of this development process has the potential to affect various aspects of our lives, including our social satisfaction, health, and careers (Huang, 1999).

Methodology. *Literature reviews identify important knowledge gaps and motivate researchers to fill them (Webster & Watson, 2002). In this paper, we aim to conduct a systematic literature review (Cook, Mulrow, & Haynes, 1997) of relevant studies examining the Knowledge Transfer in Family firms. In this sense, according to Tranfield, Denyer, and Smart, (2003), to more clearly establish the conceptual boundaries, we first examined pertinent findings that were published in management publications (select studies that applied Tranfield et al. (2003) approach are: Hoskisson, Chirico, Zyung, & Gambeta, 2017; Terjesen, Hessels, & Li, 2016). Then, we used Scopus database and ISI Web of Science to search for all articles published from all years to present (January 2025) using the search terms, ["Know* Trans*" AND "famil*"]. Manually tracking citations for additional relevant articles in highly ranked journals is an important part of the literature review (Rashman, Withers, & Hartley, 2009); however, the manual search did not produce any additional contribution on the topic.*

We searched using the phrases ["Know Trans*" AND "famil*"] using the quotations marks and the boolean operator "AND" to delimit the research on these specific terms, in [Article title, abstract keywords], and obtained 2.025 works.*

We then limited the research to Subject Area (1) [Business, Management and Accounting], (2) Psychology, (3) Social Sciences using the command [LIMIT TO].

Considering their internal criteria, the suggestion is to use the command [LIMIT TO] to filter the [SUBJECT AREA] because it is a more inclusive command. In this step, we obtained 530 documents.

The Scopus Database includes different types of documents, including articles, book chapters, articles in press, books, and reviews. According to our research protocol, the systematic review included only articles and reviews published in English. We therefore excluded the other documents. We used both commands and determined that in this case, use of either of the commands, [LIMIT TO (selected items)] or [EXCLUDE (selected items)], with 417 articles.

Second, according to our protocol, we read the entire abstract and the entire article when additional clarity was needed, to exclude: [Articles that primarily focused on knowledge transfer, but not on family firm context] and [Articles that primarily focused on family firms, but not on knowledge transfer.].

The final sample included 60 articles for further analysis.

Then on WOS Database, we searched for the phrases [“Know trans*” and “famil*”] in [Topic] and obtained 1,827 results. Then, according to the exclusion criteria, we first considered if the article was in our area of interest. The Web of Science Categories have two commands, [REFINE] and [EXCLUDE]. We used the command [REFINE] to filter the articles to include those in the following categories: (1) Business, (2) Management, (3) Business Finance, (4) Psychology, and (5) Sociology. We obtained 172 works. Thus, we set the first criterion because it included the higher number of works. Second, we applied [REFINE] to the search to filter by Document types and Language. In the Web of Science database, the Document types available include articles, proceeding papers, reviews, and editorial material. We applied [REFINE] to the results to include only articles and reviews and obtained 149 articles. Then, using the Language filter (set to English), we obtained 147 works.*

The first step was manually verified to determine how many papers were in common with the Scopus research. 53 papers were included in both database search results. Thus, according to our protocol we are reading the entire abstract (and the entire article if additional clarity was needed) of the 94 remaining articles and excluded those that were: [Articles that primarily focused on family firms, but not on knowledge transfer] and [Articles that primarily focused on knowledge transfer, but not on family firms.]. The final sample included 8 articles for further analysis.

Results. *Our systematic literature review on knowledge transfer among family members shows a significant gap: studies focus more on the relationship between the learning process of individual family members and the entrepreneurship orientation, rather than on the methods of transmission and its content.*

Following the selection of literature to be investigated, we manually compared the two data collections and finalized the dataset, which consisted of 68 articles for final analysis.

The works are spread over a period of 20 years, from 2004 to 2024, most of the papers focus on 2024, this demonstrates an increased interest for the topic of the knowledge transfer process within family businesses.

The qualitative research method is often employed in studies due to the novelty of the research topic, allowing for exploratory insights and theory building through inductive reasoning (Letonja et al. 2016), Case study methodology is widely used in research, particularly for understanding complex phenomena within family businesses. This approach allows for in-depth exploration of specific cases, enhancing the richness of the data collected (Wynn et al. 2018).

The iterative process of data collection and analysis is crucial in qualitative research, enabling researchers to adapt their methods based on emerging themes and insights, and this flexibility is essential for capturing the dynamic nature of family business interactions

Trevinyo-Rodriguez et al. (2010) used a methodological triangulation, making use of multiple data sources such as interviews and company documents, enhances the reliability and validity of findings. This approach provides a comprehensive understanding of the knowledge transfer processes within family businesses (Wynn et al. 2018)

We can notice that the selection of cases for study can vary, with no consensus on the ideal number of cases. However, a multiple-case study approach is often preferred to strengthen the robustness of the findings through cross-case analysis.

There is a lack of longitudinal studies that capture the dynamic process of knowledge transfer during succession in family businesses, which is essential for understanding the multistage nature of this phenomenon, and research often relies on a limited selection of databases, such as the Web of Science, which may restrict the span of research topics and findings related to family firms and sustainability.

Furthermore, many studies focus exclusively on specific geographic areas or types of family businesses, leading to potential biases and limiting the generalizability of findings to broader contexts.

Despite the diversity of theories used, with different purposes and significant contributions, many of which focus on the individual learning capacity of individuals (family members) and on the problems related to the issue of succession, we can find important gaps:

- *There is a lack of comprehensive studies examining how generational gaps affect communication processes in family businesses, particularly regarding the transfer of tacit knowledge between older and younger generations.*
- *Existing research often overlooks the impact of emotional dynamics on communication effectiveness within family firms, which can either facilitate or obstruct knowledge sharing.*
- *The role of structured communication methods, such as regular meetings and feedback systems, in bridging generational divides is underexplored, despite their potential to create a common language.*

- *Many studies focus on physical proximity as a barrier to communication, neglecting the effectiveness of virtual communication tools in facilitating knowledge flow across distances.*
- *The influence of family roles and relationships on communication styles and knowledge transfer is not sufficiently addressed, leading to a gap in understanding how these dynamics affect overall business performance.*

Research limitations. *Through the analysis of existing literature, it is possible to identify knowledge gaps or areas where research is limited. This offers opportunities to contribute to such areas through new explorations.*

Family businesses are highly diverse, and communication dynamics may vary significantly across different sectors, business sizes, or geographical locations. The research tends to focus on a limited area of interest, that restricts the ability to generalize findings to the broader population of family businesses (Astrachan & Shanker, 2003).

A significant portion of research on family business communication comes from Western contexts, where family business dynamics may differ from those in other cultures, this cultural bias limits the external validity of the findings in non-Western settings; in collectivist societies, family and business distinctions may not be as clearly drawn, which can affect communication strategies (Chua, Chrisman, & Sharma, 2003).

The research focuses primarily on internal family dynamics, with limited attention given to how communication with external stakeholders (e.g., customers, suppliers, investors) could e affects the businesses, however, studies often neglect how external relationships shape or are influenced by family dynamics, especially during leadership transitions, conflicts, or decisions about business strategy (Tàpies & Fernández, 2011).

Managerial implications. *The unique dynamics of family businesses, such as the connection between personal and professional spheres, generational conflicts, and emotional attachment, require tailored communication strategies to promote business success while maintaining family serenity.*

Clear and transparent communication between family members can reduce misunderstandings and conflicts, especially in decision-making processes (Ward, 1987).

Moreover develop open and structured succession planning processes, with clear communication regarding expectations, roles, and the selection of future leaders can minimize misunderstandings and helps prepare the next generation for leadership (Sharma, Chrisman, & Chua, 2003).

Finally, encourage open communication about innovation and change, ensuring that all family members are on the same way regarding the business's evolution. It's important to consider tradition with the need for innovation (Dyer, 2006).

Originality of the paper. *The innovative aspect of our research is the application of the Family Communication Patterns Theory (FCPT) to analyze these processes. By using FCPT, this study offers a unique perspective on how family communication dynamics shapes the transfer of entrepreneurial knowledge and intentions. The theory helps to identify the communication styles that are most effective in fostering an environment conducive to knowledge sharing and entrepreneurial growth. Understanding these patterns can aid family businesses in creating strategies that enhance open, supportive, and constructive communication, ultimately facilitating smoother transitions and sustained business success.*

In summary, the study highlights the critical nature of leadership and ownership transfer challenges in family businesses, underscores the importance of targeted surveys on intergenerational knowledge transfer, and introduces an innovative approach by applying the Family Communication Patterns Theory to this domain. These conclusions provide a comprehensive framework for future research and practical applications aimed at ensuring the longevity and prosperity of family firms through effective knowledge transfer and succession planning

Key words: *Knowledge transfer, Family, Entrepreneurship, Communication dynamics, Family Patterns Theory*

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Track 10
Strategic Communication

Municipalities Facebook Pages and sustainability challenges

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Abstract

All questions concerning sustainability and climate change are public and political issues. They belong to the realm of local, regional and national governments worries. How did municipalities in Portugal, in 2024, use their Facebook Pages to inform, share or negotiate these themes with their citizens? Which were the major concerns while communicating on the referred social network about these issues? These are some of the questions that shaped the research being presented here. Content analysis was the research method used to organize and understand the data.

Framing of the research. *In recent decades, environmental issues have become a matter of global concern. The careless way in which humanity has treated the environment and ecology, in a period of escalating growth, has led to the point of no return at which we find ourselves. From the early 1960s with Silent Spring (1962), through Roger Dajoz's major work of 1969, Prècis d'Ecologie (General Ecology in the Brazilian translation), to the early 1970s with the "United Nations Conference on the Human Environment" (1972), or the masterful report The Limits to Growth (1972), up to our contemporary times, the discourse on environmental issues has not only given rise to a series of transformations, from warnings about the dangers of a distant future; to the discourse on urgent changes that need to be implemented, to the use of the notion of "crisis" and its positioning as "crisis communication", now well into the 21st century. When The Limits to Growth (1972) was published, commissioned by the Club of Rome and coordinated by Dennis Meadows, it began with a quote from U Than, the then Secretary-General of the United Nations, in which he urged States to join together in the pursuit of a more equitable, inclusive and sustainable world. In the work that revisits this first report, the authors state unequivocally and using their own words that the global economy was already (at the beginning of this millennium) far beyond the levels of sustainability for the "fantasy of an unlimited globe" to be maintained, but that U Than's call remained unanswered (Meadows, Randers and Meadows, 2004).*

The discourse on sustainability / climate change has thus, in recent years, by necessity, entered the discourse of ordinary citizens. The big question, however, is what sources of information and communication, what sources of empowerment do citizens have at their disposal to make the right decisions about their behavior and the behaviors to demand from their political representatives. We will refrain here from addressing the issues of information, misinformation and disinformation in detail, but simply remember that it is the obligation of governments, at all levels, to be reliable sources of information and communication and active actors with their citizens in the co-creation of public policies (Morris, 2021; Pasquier, 2012).

Much has been theorized about the difficulty in defining the concept of "Public Communication", with its field and activity not being fully stabilized (Bessières, 2009). It often appears associated with administrative information, communication to citizens, communication of general interest, institutional communication (Campillo-Alhama, 2016). It is understood as a component of public institutions and their functioning (Bessières, 2009) and defines the communicative and relational interaction between the administration and citizens (Campillo-Alhama, 2016; Ládron de Guevara, 2023). Public Communication is in itself an instituting category of social practices, of the development of the state's own institutions, and as is evident from its various government bodies, state schools and universities or agencies and other public bodies. While the aim of this article is not to discuss the concept of "Public Communication", it is important to note that often in the context of public administrations, and especially local governments, there is confusion between what is the domain of the political, in the sense of political party, which are not public entities, but so many times interferes in the domain of public communication. Several authors (Bessières, 2009; Pasquier, 2012; Campillo-Alhama, 2016, Ládron de Guevara, 2023) have made it explicit in one way or another, many defending the separation and complete definition of concepts, others realizing the difficulty of this same distinction.

Public Communication constitutes a fundamental link between the State and the citizen. It is a duty that the Portuguese State needs to guarantee, and which, in fact, has long been reflected in article 19 of the Universal Declaration of Human Rights, that of providing objective and timely information to citizens, which allows them to make their own decisions (Ládron de Guevara, 2023). It has been argued that "Public Communication" should be understood as activating citizen

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participation, promoting the co-creation of public policies with the contribution of the community and this is precisely the interpretation being promoted in this paper.

The exponential increase in available data, the speed with which these are processed and transformed, or not, into information, in this century, alongside technological evolution and the digitalization of society, are aspects that have increased the capacity for interaction while making communication processes much more complex and challenging (Pasquier, 2017). Reinforcing the legitimization of the role of Public Communication in the connection between the State and citizens is fundamental to distinguish it from political communication, responsible for the production and dissemination of information focused on the interests of political parties and/or political figures. A complete public service that encourages the expression of citizenship, participation in democratic debate and the promotion of actions that promote the involvement of citizens in managing their daily lives seems a way to go in order to achieve the goals of sustainability and fight against climatic changes. How are the municipalities using their social media to promote a new way of life? As Yann Arthus Bertrand (2021) has put it better than anyone else "Ce n'est pas la Terre que nous devons faire mourir, c'est notre vision du progrès".

Purpose of the paper. *This work is part of a larger research project where the main purpose is to understand how municipalities in Portugal, in 2024, fulfilled their public communication desiderata using the major online social media in Portugal for the local governments: Facebook. In reality the great majority of local governments do not have any other social media network. Due to reasons that we are not going to develop here, X, for instance, has never had great expression in Portugal and the same can be said about other platforms. Instagram is starting to be used but, in general, replicates the Facebook posts. In the research being presented here authors had a double folded purpose:to understand what are the main concerns of the municipalities, as expressed in their Facebook pages, concerning the 13th goal (understood broadly) of the Agenda 2030 for Sustainable Development and how these themes were presented. In Public Communication it is quite common to try to figure out if the municipalities use a more administrative tone, a more informative one or, to use the word loosely, a real communication, a way that promotes engagement, participation and change among the citizens. Wolton (2022) called it communication as negotiation. So it was also the purpose of this research to understand the type of information/communication presented by local governments while mentioning these issues. Where they essentially promoting or reporting on events that dealt in general with these questions, what could be understood as a top-down informative way, or to promote - at least in a certain sense the municipality government the a social changes implemented at the local level, or are municipalities in a level that we may consider as awareness communication for the behaviour and social change, that is, some communication campaigns, processes that actively implicate citizens in their ways of life.*

Methodology. *Reflection on qualitative and quantitative research consists of a distinction between explanation and understanding of the object of investigation; between the personal and impersonal role of the researcher in the process; and also, a distinction between discovered knowledge and constructed knowledge (Stake, 2009). The differentiation between the two types of research mentioned can also be defined depending on the type of knowledge they aim at. Quantitative research privileges explanation and control, while qualitative research seeks to understand the complex interrelationships between everything that exists. If, on the other hand, quantitative research wants to create explanations, in a cause-effect logic, with a view to reaching generalizations, and thinks of singularity as an error (Patton and Appelbaum, 2003); on the other hand, qualitative research seeks to promote understanding, treating the uniqueness of cases and contexts as essential for research (Stake, 2009). In reality the content analysis method emerged as a quantitative method, that is, a process that enabled the transformation of narrative data into numeric data.*

Content analysis allows researchers to work on longer or shorter corpuses of verbal communication. This research method is based on the idea that in general terms these "texts" express forms of human behavior. In the context of this investigation, we aimed to understand how the official pages of the 308 Portuguese municipalities expressed their concerns, actions or motivations on environmental issues throughout 2024 on their Facebook Pages as this is the only social network where all the municipalities are present. Content analysis as a method of document analysis is a discreet, unobtrusive, relatively cheap method, adaptable to the most varied topics and which allows good data confinement for subsequent analysis and interpretation. The following research used both analysis: quantitative and qualitative.

We started with quantitative analysis, using the platform Fanpage Karma. This analysis was constructed on the time period between January 1st and December 29th of 2024, and used a total of 111 479 posts, the sum of all municipalities posts. The municipalities were divided into groups based on their number of inhabitants, resulting in 7 groups: 30-40 thousand inhabitants; 40-50 thousand inhabitants; 50-100 thousand inhabitants; 100-200 thousand inhabitants; 200-300 thousand inhabitants; 300-500 thousand inhabitants; and >500 thousand inhabitants. We didn't consider municipalities with less than 30 thousand inhabitants because it wouldn't be possible to have a relevant analysis due to the large number of municipalities and the programme being used for the quantitative analysis. As such the corpus was reduced to the 111479 posts of 88 municipalities.

In each group we identified the presence and frequency of concepts defined based on the Agenda 2030 goals and the GreenItaly 2022 report. A quantitative and qualitative content analysis was used to understand the concepts that were highlighted in both documents. If Agenda 2030 is the standard document GreenItaly offers an international approach to our theme. In order to minimise false negatives we´ve chosen a broader wrench of concepts and all the posts that mentioned at least one of the words (or phrases), using a keyword process with the full key word list being: sustainable development; climate change; decarbonization; circular economy; sustainable economy; green management; resource management; energetic transition; Agenda 2030; sustainable development goals and, its respective acronym, SDG. It is

important to note that the words were translated into Portuguese, as the analysis focus is the local governments of Portugal. As you can notice as Boydstun (2023) has put it, validity, reliability and transparency were objectively taken into account as described here.

In order to check for the validation of the code, we used Google Sheets to conduct a manual verification on a random sample of facebook pages, to ensure that the number of posts about the concepts was approximately the same as the given by the Fanpage Karma platform.

For the qualitative part of the research, understanding the worries with validity and reliability, the codebook was developed and tested before the coding process on a sample of the municipalities facebook pages that were not taken into account for this project (those of under 30 thousand inhabitants). This enabled researchers to minimize discordance and to converge on a consensus, for a better coding process. This analysis was conducted using human coding. The two human coders (two undergraduate students) have been previously trained, and had taken part in the codebook construction under the supervision of a senior researcher. To enable intercoders coherence and beyond the already mentioned exercise, some posts were randomly analysed also by all the junior and senior coders and the differences discussed among them all along the process.

In the qualitative part of analysis, we proceeded to categorize the posts in three groups as highlighted in the purpose of the paper:

a) events - under this category are considered all the posts that in their texts had reference to events related to sustainability issues/matters/affairs, including those that are not strictly about sustainability but mention that they follow Sustainable Development Goals (SDG), and/or have initiatives to achieve them.

b) report - this category includes/comprehends all the posts that in their texts had mentions of local government sustainability projects; communication campaigns promoted by the municipalities (including those from other entities); municipality sustainability honors or awards; and local government budget reserved for environmental initiatives.

c) awareness - for this category were selected all the posts that in their texts promote practical sustainable actions within the community; involve the citizens in the process of deciding environmental policies; calls to action for the community to participate in initiatives that fund new local sustainable projects.

As Berger (2014, 2017) has put it,t content analyses enable researchers to figure out what other humans expressed while using - in this case - verbal communication. As it may be understandable in this analysis only manifest content was under investigation. The "post" (the text) has been considered our unity of analysis.

Results. *Before proceeding to the counting and transformation of narrative data into numeric data, that is the quantification of keyword occurrences, we used the Fanpage Karma platform to gather data about the followers, activity and posts of the local government facebook pages, in the same time period of analysis (between January 1st and December 29th of 2024).*

First, we created dashboards for each group of municipalities, and then proceeded to create graphics using facebook metrics, in this case "followers"; "average posts per day";"interaction rate" and "number of posts". From this data we were able to conclude that the municipalities with less inhabitants had more followers than to be expected, though not exceeding the number of inhabitants, in most cases. In some more populated municipalities, like Loures Municipality (200-300 thousand inhabitants) there were much less followers than inhabitants, 49k respectively. Overall, the interaction rate on local governments facebook pages is not high, never going above 1% of post interaction. Though, the amount of posts on local government facebook pages is high, posting almost everyday, and in most municipalities, more than once per day.

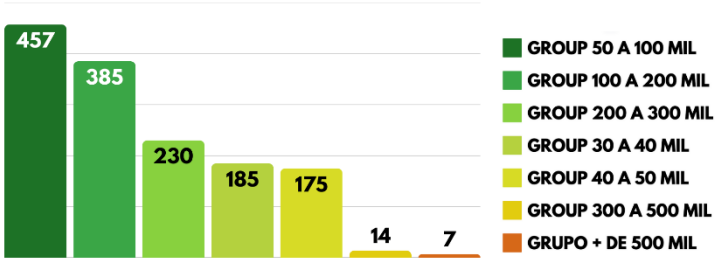
All the 308 municipalities have facebook pages, making the counting of keywords possible in all of them, except for the ones not considered in this research (those with less than 30 thousand inhabitants). The number of municipalities that make up the selected groups are represented in table 1.

Table 1. Nº of municipalities in each group

TIME GAP OF ANALYSIS	GROUP	Nº OF MUNICIPALITIES	TOTAL POSTS
from January 1st, 2024 to December 29th, 2024	30 to 40k	17	20 394
	40 to 50k	16	19 633
	50 to 100k	29	34 848
	100 to 200k	19	24 804
	200 to 300k	4	8 112
	300 to 500k	2	2 188
	more than 500k	1	1 500
	TOTA	88	111 479

The amount of posts mentioning the chosen words/phrases, in each group of municipalities, is depicted in Figure 1.

Figure 1. Number of posts about the "environment" in the different groups of portuguese municipalities

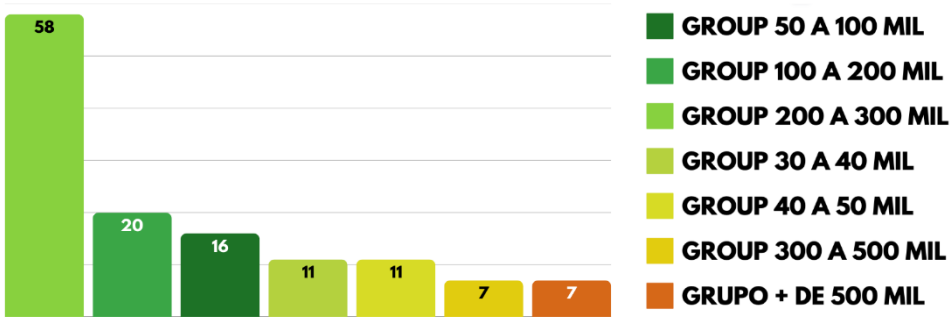


In fig.1 we can conclude that overall the municipalities with 50-100 thousand inhabitants have the most posts about environment and sustainability, counting with 457 posts, and that the one with >500 thousand inhabitants has the least posts about the topics, respectively 7 posts. These results have a relation to the number of municipalities included in each group, as there are more posts for analysis in groups with more municipalities, which makes the number of posts related to the themes biased.

Figure 2. Nº of posts related to the environment in total number of posts in each group of portuguese municipalities

In fig. 2 we can see the amount of total posts (various posts) in the different groups in relation to the posts about sustainability. This graph shows that the higher the total number of posts in the group, the higher the number of posts on the topics. Except in the case of the municipalities with 200-300 thousand inhabitants, which have 230 posts on the topics, 2,84% of all posts of this group (8112 posts, respectively). This group has a higher number when compared to the groups with 30-40 thousand inhabitants, with 185 posts, which is equivalent to 0,91% of all posts (20 209), and 40-50 thousand inhabitants, with 175 posts (0,89% of all posts), respectively.

Figure 3. The average number of posts about the sustainability per municipality in each group

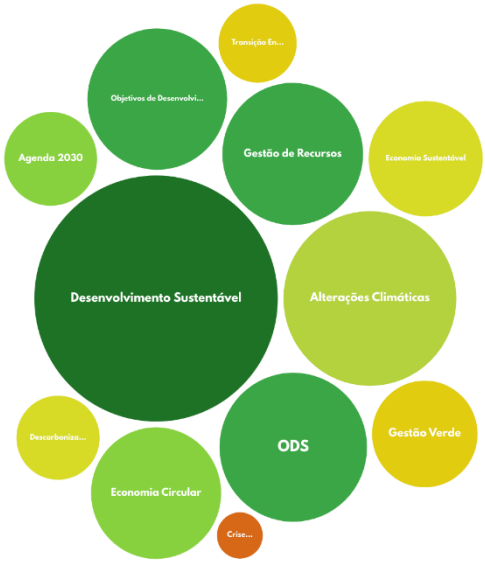


We were able to see that the fact that each group is made up of different numbers of municipalities affects the results we can obtain from figure 1. In this way, we can see in fig.3 that, in contrast to what we were able to analyze in figure 1, the group of 50 to 100 thousand inhabitants is not the group where municipalities are most active in terms of communicating about sustainability, due to the number of municipalities it encompasses (29 municipalities).

Through these results it is possible to conclude that, on average, the group that emerged with the most posts about sustainability, per municipality, over the year 2024 was the "200 to 300 thousand" inhabitants group, with an average of 58 posts related to sustainability per municipality.

Also as we can see above, the groups of 300 to 500 thousand and > 500 thousand inhabitants are the groups with the fewest environment-related posts per municipality, like we have seen in figure 1, even though that number is influenced by the total number of municipalities.

Figure 4. Environment-related words most used by portuguese municipalities



In addition to this data, as you can see in fig.4, we also analyzed the most frequent sustainability-related words in the posts of the portuguese municipalities. As seen above, the searched words were 12, already identified in the methodology used for this paper.

We were able to conclude that the most mentioned word in a global overview, in the year of 2024, of all Portuguese municipalities was "Desenvolvimento Sustentável" (Sustainable Development), with 847 mentions, and that "Crise Climática" (Climate Crisis) was the least used word, with 30 mentions respectively. These numbers are related to a total of 111 479 post texts.

Through this line of thought, it became relevant to analyze which words were most used in the posts texts by each group of portuguese municipalities. As we can see, in fig. 5, "Desenvolvimento Sustentável" (Sustainable Development) was the word most mentioned in each group of portuguese municipalities.

Figure 5. Related words with sustainability most used in each group of portuguese municipalities

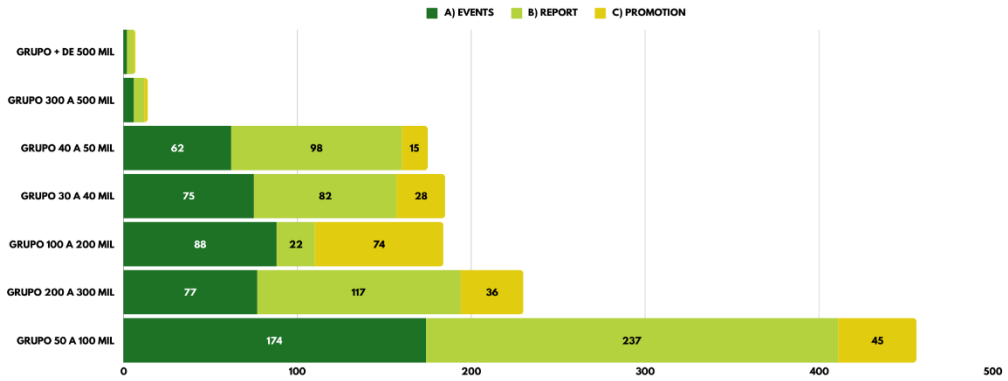
In fig. 05, we can see the words most and least mentioned by each group of municipalities, in the texts of the posts, which is not equivalent to the posts themselves (that have at least 1 mention of the word) as in one text the word might repeat itself various times.

We are able to show that the 50 to 100 thousand inhabitants group is the one that mentions most the words related to sustainability and sustainability goals mentioned in the Agenda 2030 goals and GreenItaly 2022 Report, specifically with 1013 words overall. The top three words most mentioned by this group were "Desenvolvimento Sustentável" (Sustainable Development) with 268 words, "Objetivos de Desenvolvimento Sustentável" (Sustainable Development Goals) with 136 words and the acronym "ODS" (SDGs) with 125 words.

Beyond that we can verify that the word "Alterações Climáticas" (Climate Changes) is also an important word in the communication of the portuguese municipalities, since it has been revealed to be, more than once, a word in the top 3 of the most mentioned words by municipalities related to sustainability, in particular on the groups between 100 to 200 thousand inhabitants (156 mentions); 200 to 300 thousand inhabitants (64 mentions); and in the group 40 to 50 thousand inhabitants (46 mentions).

The word least mentioned in the texts of municipalities, besides "crise climática", was "gestão verde" which doesn't appear in posts of the groups with 300 to 500 thousand inhabitants and +500 thousand inhabitants. This may be related to the fact that these are the groups with the least municipalities.

Figure 6. Qualitative Analysis: Type of posts related to the environment in 3 categories: A) Events; B) Report; C) Awareness



As for the qualitative analysis, we can see in figure 6 that the majority of posts fall under the category "Reports" in all groups, except for the "100-200 thousand" inhabitants group, which has mostly posts under the category "Events" (88 posts). Most of "Report" posts are about plans and initiatives of the local governments relating to sustainability/environment, the other portion of posts in this category are mainly about local government budget reserved for environmental initiatives and awards/honors (related to these matters) received by the municipalities. This post quote emphasizes the top-down communication approach used by municipalities: "Câmara de Lagos vai investir maioritariamente em Habitação, Abastecimento de Água e Ensino" (the Lagos city council is going to invest majorly in housing, water suppliance and education).

The posts under the category "Events" also make up a significant amount of the total posts with keyword occurrences. Most of these are about workshops; local events and initiatives; and events from all other entities except the local government, regarding sustainability/environment. It is also clear in figure 6, that the category with fewer posts is "Awareness", which shows few interest of the local municipalities to inform and to involve the community in sustainable practices and new ways of life. Except for the "100-200 thousand" inhabitants group, which has 74 posts that fall under this category, a considerable amount in comparison to the other groups. The augment of "Report" or "Event" posts can be an issue that explains the low interaction on posts related to sustainability matters, as we were able to analyse , with Fanpage Karma, previously, to complement the analysis, when comparing posts about quotidian topics (events, photos of municipal landmarks, special commemorations). Perhaps, if there was more of a call-to-action approach, the results of the analysis would be different and communities would feel more involved and eager to engage, or change their ways of life. But this is just, what it is, an hypothesis.

If the 13th goal of the Agenda 2030 themes are in the agenda of the municipalities as the above graphics may show, the consistency of the sustainability/environment discourse is not a reality at all. Moreover, it is not at all clear whether the capacity to get the citizens involved or to listen to their worries and explicitly address those ideas and plans, at least, in the Facebook pages has been achieved. The lack of engagement and involvement with citizens on social platforms has been also noted by researchers in other european countries (Mabillard, Zumofen, Keuffer, 2021; Mabillard, Zumofen, Pasquier, 2022; Zumofen, Mabillard, Pasquier, 2023; Mabillard, Zumofen, 2024). As Pasquier (2017) has put it, there seems to be still a very conservative approach to the way local governments first understand Public Communication, and secondly use Facebook; a top-down channel of information.

If dealing with issues of misinformation, lapses, and essentially desinformation strategies, seems to be an increasing concern of contemporary democracies, a new look at the reality of Public Communication is probably urgent. We believe that the areas that many authors tend to consider as complementary - in the theoretical framework of this discipline (public engagement) - cannot continue to be understood in this way, if we really want to promote a change in the way we

face issues of citizenship, active participation and democracy in the midst of "post-truth contexts" (Tiercelin, 2023) or "metamorphosis of our democracies" (Diamanti and Lazar, 2018).

To conclude, as Innerarity so elegantly puts it : "changes only happen when structures, processes and collective rules are altered. The knowledge of a society is something more than the mere accumulation of existing knowledge, such as an intelligent organization, it is, through the synergy produced between rules, institutions and procedures, and not by the mere addition of one or more intelligences in personal terms" (2021, pp.22 and 23).

Research limitations. *The main research limitation is the lack of analysis at all the social networks where some municipalities are present. Concerning specifically the research being developed here some questions as those of validity and reliability might have needed to be better developed, even if authors have tried to make the research using content analysis as robust as possible. The question of having not analysed the municipalities under 30 thousand inhabitants might also be seen as a limitation as we don't have managed to be able to offer an analysis of all the pages. It must be said however that not only a random sample of pages were analysed as a training exercise as well as a recent research had been done in the frame of a larger project in what concerns the 20 to 20 thousand inhabitants municipalities. Even if not concerning the environmental themes (Eiró-Gomes, Rodrigues, 2023) it showed that the way pages are treated in these smaller municipalities is even less focused on the discussion of these kind of themes.*

Managerial implications. *Questions concerning sustainability, the environment and specifically those regarding "climate change" are seen, almost 75 years after the first warns, as a public issue, "public" in the sense of impacting all of us, but also as being a theme of discussion in the public space, or in different public spheres, as well as an important issue for governments at all levels, from the local to national, or even to international platforms. "Climate inaction is not only a political problem but fundamentally an ethical and communicative issue" (Almiron, Xifra, 2020, p.2). It's precisely to promote action, in a pragmatist theoretical approach to research, that authors will construct a short report on the global results of the research being presented here, as well as a proposal to construct a general campaign for all the municipalities to be used in the meta pages concerning the major changes to be negotiated with citizens in what concerns livelihoods and lifestyles. To offer ideas for a more involved and immersive Public Communication, is the ultimate goal of a more general research project from which the data being presented here are only those directly connected with sustainability and climatic changes. We hope that this paper might help local governments to value communication professionals, and as online community managers too, and the need for a new digitized Public Communication on social media. Even if the smaller municipalities were not expressed here, the paper might also be important for those, as they are the ones that struggle with greater lack of funds for communication and social media.*

Originality of the paper. *All the problems concerning environmental issues, and climate change, are, as we all know, wicked problems. A wicked problem is a problem that is "unclear, interdependent, multi-causal, unstable, uncertain, nonlinear, multi-centered and dynamic" (Aballi, 2020, 233). All of these issues are often conflicting realities where different interests come into play, both political and economic, as well as conflicts of values, not to mention scientific data that are often the subject of major disinformation campaigns. To document the lack of use of Facebook pages to inform, share and negotiate (Wolton, 2022) knowledge on the needs of behavioral and social change in accordance to science (Morris, 2021) and as an instrument of public communication to create awareness and mobilize citizens to co-create change (Norton, Grecu, 2020; Akin and Rice, 2013), might be seen as a call to action for the role local governments could (should) play in empowering citizens. It might be noted that it is local governments responsibility to act as reliable sources in a world where and to quote Tiercelin (2023) there seems to be a disgust with truth.*

Key words: *municipalities, sustainability, communication, public communication, empowerment*

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Corporate Social Responsibility: How can businesses implement their efforts?

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Abstract

Corporate social responsibility (CSR) communication increasingly relies on social reports as transparent, authoritative tools that attract investor and policymaker attention. This study analyzes social reports from Italy's 50 top-performing companies to identify priority CSR domains and concrete implementation actions. Using a mixed-method approach combining manual coding and Python-assisted content analysis, we identify six key macro-areas where companies concentrate their socio-environmental efforts. Within each area, we catalogue specific actions companies implement, from renewable energy educational institutions to supplier sustainability certification programs. Our findings reveal an evolutionary trajectory as organizations transition from standardized approaches toward context-specific interventions leveraging their distinctive competencies. This research contributes to CSR literature by providing different insights for practitioners and scholars. An empirically-derived classification framework based on actual corporate practices; an innovative structure integrating six distinct intervention domains; a bridge between Triple Bottom Line theory and operational implementation; and cross-sectoral insights transcending industry-specific limitations. The resulting framework serves as both a scholarly contribution advancing CSR theory and a practical guide for organizations to strategically prioritize socio-environmental investments aligned with their core competencies.

Framing of the research. *How corporations function within communities has transformed substantially beyond simply focusing on financial and regulatory obligations, as organizations progressively take on important community-focused duties and commitments (De Villiers et al., 2021; Weber et al., 2023). This evolution has made social communication essential through various channels, encompassing both institutional and informal approaches (Manetti & Bellucci, 2016; Tuan et al., 2024). While companies leverage these platforms to demonstrate their commitment to addressing social challenges, they often encounter skepticism regarding the authenticity of their initiatives, frequently facing accusations of greenwashing (Pizzetti & Seele, 2021). Successful societal engagement requires careful strategic consideration, particularly in selecting issues where companies possess relevant expertise and can generate an impact (McPhail et al., 2024). In this regard, the social report has emerged as an instrument for demonstrating transparency and commitment in sustainable actions (Alhumud et al., 2025; Cho & Patten, 2007). This type of communication allows companies to detail and quantify their commitments more precisely and clearly (Troshani & Rowbottom, 2024). However, studies on CSR communication through social reports exhibit some gaps. For instance, previous researches adopt a sector-specific analysis, focusing on industries such as banking (Avrampou et al., 2019; Ferraro & Veltri, 2024) or energy (Arena et al., 2023). Moreover, another research stream focuses on consumer perceptions of socially responsible actions communicated in social reports (Afzali et al., 2021; Boccia & Sarno, 2012; Parray et al., 2024). Finally, some scholars have investigated how the communication of CSR initiatives impacts corporate financial performance (Ahsan, 2024; Awaysheh et al., 2020; Ma & Yasir, 2023). Consequently, it emerges that the literature lacks studies examining the specific types of actions companies undertake to contribute to social and environmental society's issues. Based on this, we suggest that analysing social reports to identify the key issues businesses are currently prioritizing and the actions they are implementing could be highly valuable. These insights could not only enhance the direction of future research but also provide companies with practical and concrete insights into which socio-environmental challenges should be addressed and which types of actions may be most effective.*

Purpose of the paper. *This research has two main goals. Firstly, it aims to identify the most frequently addressed social and environmental issues by companies. Then, it seeks to determine specific actions undertaken to address these socio-environmental challenges. To accomplish these objectives, business sustainability disclosures have served as the principal materials for examination and investigation. Specifically, social reports were selected because they represent the most credible and comprehensive documents for analyzing corporate social communication, receiving significant attention from policymakers (as evidenced by recent directives), and providing more detailed information compared to alternative social communication formats (Cardamone & Giunta, 2012; Du & Yu, 2021).*

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Methodology. *This study uses a qualitative methodology to examine the complexity and nuanced aspects of the subject matter (Tuckerman et al., 2023), employing a methodical and structured approach to textual examination that maintains replicability through standardized computational techniques (Kitto et al., 2023). Through content analysis and thematic interpretation, we were able to identify patterns and trends across corporate sustainability practices. For data collection, we utilized a targeted sampling strategy (Obilor, 2023). We analyzed the 2023 social reports of the fifty top-performing Italian companies, identified through the Mediobanca Annual Report 2023. The selection focused on high-revenue organizations based on the assumption that companies with greater financial resources and market position would typically develop more comprehensive, specific, and structured sustainability programs than their smaller counterparts.*

Given the substantial volume of data, with some reports exceeding 500 pages, we employed an exploratory Content Analysis approach (Mayring, 2021). This integrated methodological framework combined manual analysis with Python-assisted techniques in an iterative process, allowing us to systematically process and analyze the extensive textual information. This methodological integration enhanced analytical rigor, comprehensiveness, accuracy, and replicability throughout the examination process (Lewis et al., 2013). Moreover, our approach aligns with established protocols in textual document analysis and content summarization techniques (Raman et al., 2022; McKinney, 2022), providing a robust framework for systematic data organization and analytical processing.

The methodological approach comprised two distinct phases. In the initial stage, we conducted a manual content analysis to identify significant thematic patterns within the data. In this phase, the main SDGs in which companies are committed have also been extracted. This process yielded six distinct macro-categories of intervention within the social reports, which subsequently informed the development of our analytical framework (see Figure 1).

The secondary phase employed computational methods through Python programming to validate the findings derived from the initial manual analysis. For each identified macro-category established in the preceding phase, we selected representative lexical indicators. The implemented algorithmic approach facilitated the systematic association of each keyword with its corresponding thematic domain, enabling the calculation of thematic prevalence within the analyzed social reports.

Results. *The frequency analysis of the social reports from fifty Italian companies reveals a clear hierarchical structure in corporate CSR priorities, directly answering our primary research question (RQ1): "Which social and environmental issues do Italian companies prioritize in their CSR strategies. Results identified six fundamental macro-areas where corporate sustainability efforts are concentrated. These macro-areas represent the key domains in which Italian companies allocate resources and attention, providing a comprehensive mapping of the current CSR landscape in Italy.*

Companies demonstrate a differentiated distribution of commitment across these six macro-areas, with some domains receiving significantly more attention than others. Human Resource Management emerges as the top priority, reflecting a strong focus on human capital development and organizational well-being. This emphasis on human dimensions is accompanied by substantial investment in Sustainable Innovation, encompassing initiatives related to renewable energy and digital transformation. Social Responsibility constitutes another significant area of intervention, characterized by initiatives that connect companies with their surrounding communities, while Resource Efficiency reflects corporate commitment to circular and less impactful operational models. The framework is completed by Collaborative Development, which focuses on creating sustainable stakeholder ecosystems, and Inclusive Growth, aimed at fostering a fairer and more accessible economy. This distribution pattern reveals interesting sectoral variations, with manufacturing firms demonstrating greater emphasis on innovation and resource management, while service-oriented businesses typically allocate more resources toward human capital and community engagement initiatives. The prioritization also appears to correlate with regulatory pressures and stakeholder expectations specific to each industry.

The quantitative analysis results provide an organizational framework that enables a meaningful comparison of corporate initiatives across different industries and priorities. Inclusive Growth encompasses all corporate initiatives aimed at promoting more equitable and accessible economic development. Quantitative analysis reveals that Italian companies dedicate approximately 6% of their total CSR efforts to this dimension, with a particular emphasis on reducing economic disparities. Companies tend to favour large-scale economic impact interventions over more localized development initiatives. Then, Sustainable Innovation represents one of the most significant domains of intervention, accounting for 23% of total CSR engagement. This macro-area includes all initiatives aimed at developing more sustainable technologies, processes, and products. Italian companies show a clear preference for projects related to renewable energy, which constitute most of the initiatives in this domain, alongside investments in digitalization and sustainable automation. Additionally, Resource Efficiency, with 11% of total CSR efforts allocated, highlights corporate commitment to more circular and less impactful production models. Initiatives in this domain focus on optimizing the use of natural resources and minimizing waste, with a predominant emphasis on waste reduction and management over sustainable water resource management. After that, Social Responsibility absorbs approximately 21% of CSR initiatives and represents the direct interface between the company and its surrounding community. It includes educational, healthcare, social integration programs, and philanthropic activities. Italian companies are evolving from a purely philanthropic approach toward a more structured and strategic social engagement, particularly emphasizing educational and inclusion initiatives. Finally, Human Resource Management emerges as the dominant macro-area, accounting for 29% of total CSR engagement. The prominence of this area highlights the increasing recognition among Italian companies of the strategic value of human capital for organizational sustainability. Initiatives include training programs, workplace safety policies, and diversity and inclusion measures. Lastly Collaborative Development represents 8% of CSR efforts and focuses on sustainable stakeholder relationship management, including strategic partnerships and initiatives

promoting sustainability throughout the supply chain. Despite its smaller quantitative representation, this dimension is critical for the effective implementation of systemic sustainability strategies.

The distribution of engagement across these six macro-areas offers a comprehensive overview of how Italian companies are interpreting and operationalizing sustainability. Beyond identifying priority macro-areas, it can be essential to understand some specific actions implemented by companies in each domain

Our findings reveal a diverse spectrum of concrete interventions through which companies operationalize their socio-environmental commitments across the six identified macro-areas. Within the Inclusive Growth domain, initiatives may include enhanced accessibility to energy services for vulnerable populations, targeted nutritional support programs, internal wage disparity analysis, localized employment generation, and community infrastructure enhancement projects. Instead, sustainable Innovation is manifested through specialized renewable energy educational institutions, development of photovoltaic and alternative energy infrastructure, digital literacy programs, environmentally optimized automation implementation, and strategic R&D investments in green technology development. Then, Resource Efficiency is pursued via water conservation educational initiatives, waste reduction and circular economy programs, and standardized procedural frameworks for comprehensive waste management. By contrast, Social Responsibility cluster encompasses technological enhancement of educational access, cultural engagement sponsorships, psychological support services for at-risk populations, and social integration frameworks for marginalized communities. Additionally, Human Resource Management strategies include continuous professional development programs, gender diversity initiatives in STEM fields, work flexibility policies promoting life-balance optimization, and comprehensive anti-discrimination frameworks and inclusive career pathways. Finally, Collaborative Development is achieved through strategic inter-organizational partnerships, supplier sustainability certification and capacity building, and integrated sustainable supply chain management.

The documented initiatives reflect varying degrees of implementation maturity across sectors, with financial services and energy companies typically demonstrating more sophisticated approaches to measurement and impact assessment. Notably, these interventions increasingly involve multi-stakeholder collaboration, suggesting recognition that complex sustainability challenges require coordinated ecosystem responses rather than isolated corporate actions. Our analysis further indicates that companies with more advanced sustainability practices tend to integrate complementary initiatives across multiple macro-areas, creating synergistic effects that amplify their overall social and environmental impact.

Our findings document a significant evolutionary trajectory: organizations are progressively abandoning standardized approaches in favour of context-specific interventions that strategically leverage their distinctive organizational competencies. This transition from generic to tailored implementation represents a maturation in organizational conceptualization and operationalization of social and environmental responsibilities. The evidence suggests companies are increasingly aligning sustainability initiatives with core business strategies, creating integrated approaches that generate both social impact and competitive advantage. This strategic integration reflects a deeper understanding that effective CSR requires authenticity, organizational alignment, and the application of unique corporate capabilities rather than merely adopting universal best practices or following industry trends.

The study's results are summarized in Figure 1, which provides a practical guide for companies to understand and implement societal actions and for scholar to identify future research avenues. The proposed model synthesizes our empirical findings into an organizational structure that serves as a reference point for understanding and implementing effective CSR strategies. Grounded in Elkington's Triple Bottom Line theory (1997), our framework advances theoretical understanding by identifying six distinct macro-areas of intervention that have never been systematically structured together to create a practical implementation guide. This multi-level approach overcomes the limitations of traditional CSR classifications, providing a more granular and operational mapping of sustainability dimensions. The framework is organically structured to illustrate how the sustainability initiatives of leading Italian companies are distributed across three fundamental dimensions. The Social Dimension includes two key macro-areas: Social Responsibility, which focuses on the relationship between the company and the external community, and Human Resource Management, which is centred on employee well-being and development. The Environmental Dimension consists of Resource Efficiency, aimed at optimizing the use of natural resources, and Sustainable Innovation, which is dedicated to the development of eco-compatible technologies and processes. Finally, the Governance Dimension is manifested through Inclusive Growth, which seeks to ensure an equitable distribution of economic benefits, and Collaborative Development, which is focused on the creation of sustainable stakeholder networks. This tripartite structure aligns with the Triple Bottom Line framework and seems to reflect the 'new' modern understanding of CSR. A distinctive feature of our framework is its empirical foundation. Rather than being a theoretical abstraction, it represents a real-world benchmark of the actual practices of leading Italian companies, providing a practical reference for the organizational implementation of CSR. The framework highlights that effective CSR requires moving beyond general commitments within the three overarching dimensions, social, environmental, and governance, toward the precise identification of intervention areas with specific strategic actions. The concreteness of initiatives, the careful selection of which issues to address, and the strategic definition of intervention areas emerge as key factors in drafting a clear, impactful, and effective social report. This approach can be essential for enhancing stakeholder engagement and increasing transparency.

Research limitations. *This study has also some limitations that represent an opportunity for future research. First, it is based exclusively on the textual analysis of social reports, without considering visual elements that can be crucial in this type of analysis. Then, the 24% of the analyzed companies belong to the energy sector, potentially introducing*

sectoral bias in the results. Consequently, future studies should consider other sectors or analyze a greater sample. Moreover, this research focuses exclusively on the Italian market, thus, scholars should employ a cross-cultural studies. Finally,, the communication of a practice in social reports does not necessarily guarantee its actual implementation or positive outcomes, consequently further studies are required based on other methods such as field experiments.). Lastly, the cross-sectional nature of the study provides a static snapshot of CSR practices at a given moment, without capturing their temporal evolution. A longitudinal approach could offer valuable insights into how CSR strategies mature over time and how emerging trends shape corporate sustainability efforts, allowing for a more dynamic understanding of the phenomenon.

Managerial implications. *This research provides relevant insights that may help organizations to prioritize and strategically plan their social and environmental investments.*

Our framework - reported in Figure 1 - can be a useful guide for practitioners. Specifically, it can facilitate the strategic selection of intervention areas, allowing managers to use the six macro-areas as a strategic map to determine where to focus their company's CSR efforts.

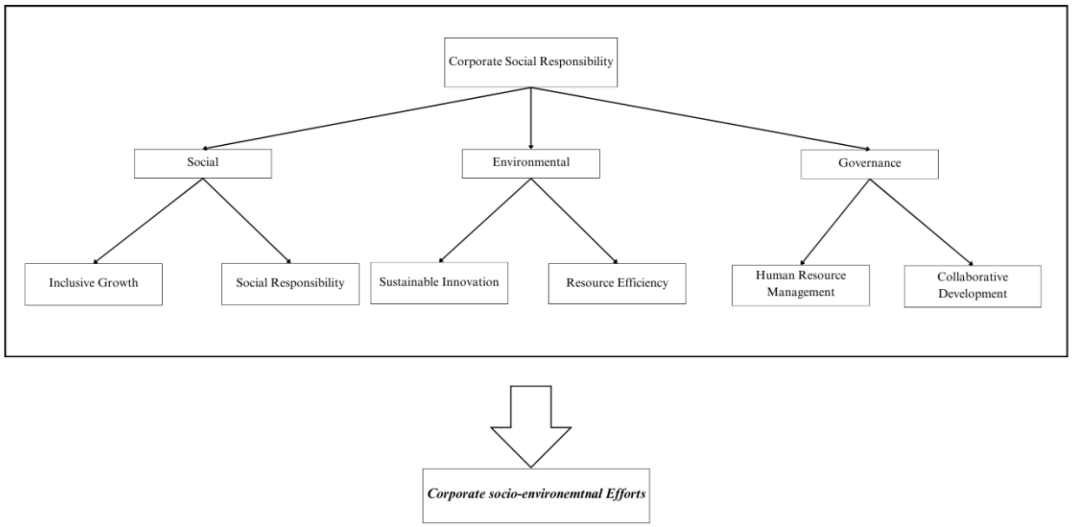
For instance, a manufacturing company traditionally focused on Resource Efficiency might discover unexplored opportunities in Inclusive Growth, broadening its impact and engagement strategies and potentially addressing less prioritized SDGs associated with society's wicked problems (Maione et al., 2024).

Second, the framework highlights the relevance of the alignment with core competencies, enabling companies to identify CSR domains that align with their existing capabilities and resources. This may improve the authenticity and effectiveness of their initiatives. Another key managerial implication is strategic differentiation. Companies seeking to stand out from their competitors can use this study to identify less frequently addressed areas, creating opportunities for differentiation in the market.

Furthermore, another critical aspect of the framework is its capacity to balance CSR portfolios. The quantitative data on resource allocations across macro-areas enable managers to assess whether their CSR portfolio is balanced or excessively concentrated in specific areas at the expense of others. The framework further promotes the strategic integration of CSR by encouraging companies to reframe CSR as a core business function rather than a peripheral activity. Each of the six macro-areas is closely connected to fundamental business functions, facilitating the incorporation of sustainability principles into daily operations and decision-making processes. This integration reflects recent developments in workplace safety (Oyewole et al., 2024), gender inclusion (Chalermchaikit et al., 2024), and circular economy practices (Elroi et al., 2023; Shah et al., 2023).

Specifically, companies can utilize this framework in multiple ways: as a diagnostic tool for assessing current CSR initiatives, a resource allocation guide for planning new sustainability programs, a structuring framework for corporate social reports, a mapping tool to identify potential gaps in CSR strategy, and a benchmarking tool for comparing practices with industry leaders, ultimately enhancing stakeholder engagement, transparency, and accountability (Macca et al., 2024; Troshani & Rowbottom, 2024).

Figure 1: Practical framework for businesses



Originality of the paper. *This study contributes to the literature on CSR communication by identifying corporate priority intervention areas and some concrete implementation actions.*

Our research offers four distinctive contributions: First, it presents an empirically derived CSR classification framework based on systematic analysis of fifty leading companies' practices, ensuring the model reflects operational realities rather than theoretical abstractions. Second, it provides an innovative structure articulating six distinct CSR intervention domains previously not integrated into a cohesive framework. Third, it bridges theory and practice by translating Triple Bottom Line concepts into concrete intervention areas. Fourth, it offers cross-sectoral insights that

transcend the industry-specific limitations of previous research (Avrampou et al., 2019; Ferraro & Veltri, 2024; Arena et al., 2023).

Our practical framework developed distinguishes itself through its action orientation, directly applicable to corporate contexts and derived from actual sustainability effort distribution. This study responds to calls for explanatory frameworks to evaluate CSR reporting (Mishra & Kumar, 2023) by proposing an empirically grounded, multi-level model offering a structured and replicable assessment method.

Key words: *Corporate social responsibility; Social report; Practical framework; Content Analysis.*

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Sustainability Communication in Corporate Strategy: The Case of Valmex S.p.A.

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Abstract

The concept of sustainability has evolved into a pivotal element of corporate strategy, necessitating businesses to integrate sustainable practices into their operations and to communicate them effectively. As environmental, social, and governance (ESG) considerations gain increasing prominence in global markets, organizations face mounting pressure from stakeholders - including consumers, investors, and regulatory bodies - to demonstrate transparency and accountability in their sustainability commitments. While major companies have widely adopted sustainability strategies, sustainability communication (SC) - a key component of sustainability management - has only recently gained attention in both academia and practice. Despite the absence of a universally accepted definition, there is a broad consensus that SC plays a vital role in enhancing understanding and engagement with corporate sustainability initiatives. The primary objective of sustainability communication (SC) is to inform and engage customers and stakeholders, rather than to persuade. The company's overarching objective is to establish a robust connection between its stakeholders and the organisation itself. This is achieved by highlighting the company's sustainability initiatives and ensuring that these align with the expectations of its stakeholders. The capacity of SC to exert influence over corporate reputation is well-documented, with the potential to serve as a primary catalyst for competitive advantage in a market characterised by increasing complexity. In contradistinction to conventional corporate communication, SC is distinguished by its emphasis on transparency, authenticity, and active stakeholder engagement. However, inadequate or poorly executed sustainability communication can lead to reputational risks, stakeholder disengagement, and accusations of greenwashing, ultimately undermining corporate credibility and trust. Companies that fail to convey their sustainability efforts effectively may struggle to differentiate themselves in competitive markets and risk missing opportunities to strengthen brand loyalty and investor confidence. This paper explores the challenges and opportunities associated with sustainability communication within corporate contexts by examining the case of Valmex S.p.A., an Italian manufacturer of heat exchangers. The study employs a single case study approach, supported by a focus group with key company stakeholders, to analyse how sustainability communication is structured within Valmex and how effectively it engages external audiences. The manufacturing sector is characterised by its own distinctive sustainability challenges, including high energy consumption, complex supply chains and stringent regulatory compliance requirements. This research offers valuable insights into how industrial firms can develop more impactful communication strategies. The findings indicate that, despite Valmex's strong commitment to sustainability, its current communication strategies are beset by significant challenges, including limited stakeholder engagement and underutilisation of digital platforms. The absence of a cohesive and interactive communication strategy has resulted in limited visibility of the company's sustainability initiatives among key stakeholders, potentially hindering its ability to build a strong reputation in ESG performance.

Framing of the research. *Recent years have seen a shift in the integration of sustainability into corporate strategy, transitioning from a voluntary initiative to a critical business imperative. A recent study (Raza & Woxenius, 2023) posits that what was once considered an optional ethical commitment has now become a core business requirement, driven by a combination of increasing environmental challenges, heightened stakeholder expectations, and stringent regulatory demands. The traditional focus on financial performance has been superseded by a new paradigm in which businesses are now evaluated based on their ability to demonstrate responsible operation, minimise environmental impact, and contribute positively to society. This paradigm shift has been precipitated by a confluence of factors, including climate change, the depletion of natural resources, rising social inequalities, and consumer activism. These factors collectively demand corporate accountability and action (Taylor, 2024).*

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One of the foundational frameworks that encapsulates corporate sustainability is the triple bottom line (TBL), as initially proposed by Elkington (1994). In contrast to conventional business models that prioritize profit maximization, the TBL approach asserts that companies must balance three dimensions: environmental stewardship, social responsibility, and economic viability. This perspective emphasises the notion that sustainable businesses must create long-term value for both shareholders and society. The concept of environmental stewardship encompasses the reduction of carbon footprints, the optimisation of resource utilisation, and the mitigation of pollution. Social responsibility entails the implementation of fair labour practices, engagement with communities, and the undertaking of diversity and inclusion initiatives. Finally, economic viability is imperative to ensure the continued profitability of a business whilst adhering to these principles. The successful integration of these three pillars enables companies to enhance their competitiveness and future-proof their operations against evolving market demands.

However, it should be noted that the mere implementation of sustainable practices alone is insufficient; effective communication of sustainability initiatives is of paramount importance. In the absence of clear, transparent and strategic communication, even the most robust sustainability efforts may remain unnoticed or, worse still, misinterpreted. Conversely, organisations that effectively communicate their sustainability commitments can enhance their corporate reputation, strengthen stakeholder trust, and gain a competitive advantage in the marketplace (Salam & Jahed, 2023). In contrast, companies that fail to communicate transparently risk undermining their credibility and facing public scepticism. Investors, customers, and regulatory bodies increasingly rely on corporate sustainability reports, ESG disclosures, and public statements to assess a company's commitment to sustainability (Eccles & Serafeim, 2013). In instances where this information is absent, unclear, or inconsistent, it has the potential to engender doubt and thereby diminish stakeholder confidence.

An even greater risk emerges when companies engage in misleading sustainability communication, commonly referred to as greenwashing. This occurs when organisations exaggerate or falsely claim to be environmentally friendly without substantive actions to support these claims (Delmas & Burbano, 2011). This deceptive practice can manifest in various forms, including the use of vague or misleading language, the selective disclosure of positive information while omitting negative aspects, or the employment of sustainability claims for marketing purposes without any tangible impact. When stakeholders identify greenwashing, the consequences can be severe, ranging from reputational damage and consumer backlash to regulatory penalties and loss of investor trust (Lin et al., 2025). To circumvent these repercussions, companies are obliged to prioritise the communication of sustainability in a manner that is both honest and verifiable, underpinned by empirical data, and substantiated by third-party certifications (Kandpal et al., 2024).

It is evident that regulatory bodies have recognised the significance of corporate transparency and have thus introduced stringent reporting standards. In the European Union, initiatives such as the Non-Financial Reporting Directive (NFRD) and its successor, the Corporate Sustainability Reporting Directive (CSRD), have been designed to standardise sustainability disclosures and ensure that large companies report on their environmental, social, and governance (ESG) performance (European Commission, 2022). These regulations mandate the publication of detailed sustainability reports, delineating the firms' impact on climate change, social policies, diversity, and ethical governance. Adherence to these frameworks fosters stakeholder trust and comparability, as investors and consumers increasingly demand access to standardised ESG data when making financial and purchasing decisions (European Commission, 2022).

Beyond regulatory requirements, voluntary reporting initiatives such as the Global Reporting Initiative (GRI) provide additional guidance for organisations seeking to enhance their sustainability disclosures (GRI, 2021). The GRI framework and more recent encourages companies to report on material sustainability issues, measure their progress using key performance indicators (KPIs), and align their disclosures with global sustainability goals such as the United Nations Sustainable Development Goals (SDGs). The adoption of these frameworks is indicative of a broader industry-wide shift towards greater corporate responsibility and accountability, reinforcing the expectation that sustainability communication must be both rigorous and transparent. Sustainability communication has gained growing academic interest over the past decade. Key themes such as sustainability reporting, green advertising, and consumer responses offer insights into communication strategies and their effects on consumer engagement. Braga et al. (2024) call for further research into both strategic and operational aspects of SC, emphasizing the need for a more balanced approach that includes social and economic, as well as environmental, dimensions.

Notwithstanding the aforementioned advancements, a considerable number of companies continue to encounter difficulties in effectively communicating their sustainability efforts. A salient emerging challenge is that of greenhushing, a phenomenon where businesses deliberately underreport or withhold sustainability information with a view to avoiding public scrutiny or accusations of greenwashing (Lyon & Montgomery, 2015). This phenomenon often originates from concerns regarding criticism for inadequate efforts, legal liabilities, or a deficiency in the reliability of sustainability metrics (Tao, 2024). Whilst greenhushing can offer companies a degree of protection against potential negative reactions, it can also result in missed opportunities to build brand credibility and stakeholder engagement. In the contemporary business environment, characterised by an emphasis on Environmental, Social and Governance (ESG) factors, organisations that fail to disclose their sustainability progress risk diminishing their visibility. Stakeholders in such a context anticipate transparency and the ability to measure the impact of sustainability efforts.

In this evolving landscape, corporate leadership plays a pivotal role in shaping sustainability communication strategies. Executives must navigate the complexities of sustainability reporting, achieving a balance between authenticity and strategic messaging. Organisations with purpose-driven leadership, where sustainability is integral to the corporate

vision as opposed to being an afterthought, have been shown to excel in the integration of sustainability into their core business strategy (George et al., 2016), employee culture (Taylor, 2025), and stakeholder relationships. It is evident that leaders who prioritise long-term sustainability objectives over short-term financial gains foster resilience, ensuring that businesses remain adaptable and competitive in the face of climate risks, evolving regulations, and shifting consumer expectations (Jones et al., 2021).

In light of the aforementioned challenges and opportunities, it is imperative to explore real-world examples of sustainability communication in action. This study examines the case of Valmex S.p.A., an Italian manufacturer of heat exchangers, to analyse how sustainability is communicated within the manufacturing sector. Manufacturing industries are characterised by unique communication challenges, stemming from the technical nature of their sustainability initiatives. These initiatives frequently encompass complex supply chains, resource-intensive production processes, and stringent compliance requirements. This ongoing study presents a case study of Valmex aimed at identifying strengths and weaknesses of communication activities as well as key recommendations for improving SC effectiveness.

Purpose of the paper. *The primary objective of this study is to evaluate the implementation of sustainability communication (SC) in a real-world corporate setting and to identify barriers that hinder effective stakeholder engagement. Through the analysis of Valmex S.p.A., the scope of this research is to understand the extent to which sustainability initiatives are communicated and perceived by stakeholders, from the perspective of managers and key personnel interviewed, and what improvements can be made to enhance communication effectiveness.*

The present study aims to establish a link between theoretical frameworks on sustainability communication and practical corporate applications. While extant literature has extensively discussed the importance of sustainability in corporate strategy (Dyllick & Muff, 2016), there remains a need for empirical research that explores how sustainability communication functions in specific industries and organisational structures. The present study focuses on Valmex, a manufacturing firm in the heat exchanger industry, and it provides sector-specific insights that can inform communication strategies in similar business contexts.

Methodology. *This study is an ongoing exploratory qualitative research project. In order to conduct an exploration of sustainability communication in a B2B company, this study employs a single case study approach, a methodology that is particularly suitable for examining complex organisational phenomena within their real-world contexts (Yin, 2018). Case study method enables researchers to conduct a detailed analysis of specific companies, thereby generating insights that can be employed to develop broader theoretical and practical implications.*

The selection of Valmex as a case study is justified by its strong commitment to environmental and social sustainability, combined with the company's recognised challenges in effectively communicating these efforts. Furtnermore, it is the first company in the Marche Region to obtain gender gap certification. Starting in 2025, it will be subject to mandatory sustainability reporting, as required for companies with more than 250 employees and an annual turnover exceeding 40 million euros. As a manufacturer in the industrial sector, Valmex provides a valuable perspective on the subject, particularly in light of the fact that sustainability communication in B2B contexts is often less developed compared to B2C contexts (Bocken et al., 2014).

The study gathered primary data through a focus group conducted with four key stakeholders at Valmex, including senior managers, employees involved in sustainability initiatives, and marketing personnel. The focus group method was selected for its capacity to engender interactive discussions, reveal diverse perspectives, and yield qualitative insights into internal sustainability communication challenges (Krueger & Casey, 2015).

The focus group discussion explored four key themes: i) The current communication strategies employed to convey sustainability efforts; ii) The perceived effectiveness of these strategies in engaging stakeholders; iii) The challenges faced in sustainability messaging; and iv) Potential improvements that could enhance communication clarity and impact. The session was transcribed and analysed using thematic coding, allowing for the identification of recurring patterns and key concerns raised by participants.

Results

Strengths of Valmex's Sustainability Strategy. *Valmex exhibits a robust and methodical dedication to sustainability, as evidenced by its comprehensive array of initiatives aimed at enhancing environmental efficiency, cultivating community involvement, and adhering to international sustainability standards. Over the past five years, the company has implemented eco-friendly manufacturing processes, which have resulted in a 25% reduction in CO2 emissions, demonstrating its capacity to integrate energy-efficient technologies into its production cycle. This is particularly significant in the manufacturing industry, where operational emissions are a major contributor to environmental degradation. The company's strategic investments in low-impact materials, energy recovery systems, and waste reduction technologies are indicative of a holistic approach to sustainability, prioritising both environmental responsibility and operational efficiency.*

Beyond its environmental efforts, Valmex is also committed to regulatory compliance and sustainability certifications, thereby reinforcing its credibility and adherence to internationally recognised best practices. The company holds the ISO 14001 certification, which sets out the criteria for an effective environmental management system (EMS). Adherence to this standard is indicative of Valmex's proactive approach to monitoring, evaluating, and reducing its ecological footprint, ensuring that its operations align with global environmental regulations. Adherence to the Corporate Sustainability Reporting Directive (CSRD), a European Union regulatory framework, is also demonstrated through the

disclosure of detailed information on environmental, social, and governance (ESG) factors (European Commission, 2022). By aligning its reporting structure with CSRD guidelines, Valmex enhances transparency, providing stakeholders with quantifiable and comparable sustainability data.

Internally, Valmex fosters a robust corporate sustainability culture, a practice that has garnered recognition and endorsement from employees across diverse departments. Focus group discussions revealed that employees place a high value on the company's commitment to sustainability, particularly in areas related to energy efficiency, ethical labour practices, and responsible sourcing of raw materials. The company's commitment to sustainability is embedded within its corporate culture, ensuring that these values are not merely directives from the top-down, but are actively embraced at all levels of the organisation. Employee involvement in sustainability initiatives has been demonstrated to enhance internal engagement, motivation, and the long-term adoption of environmentally responsible practices.

The focus group discussions revealed that the participants take pride in Valmex being the first company in the Marche Region to obtain gender equality certification (UNI EN ISO 125:2022). Furthermore, the company's commitment to socially sustainable initiatives, which are designed to enhance employee well-being, was emphasised. One such initiative, entitled "Mi Prendo Cura", provides complimentary preventive health screenings, encompassing melanoma and thyroid cancer screenings, in addition to breast examinations for women under the age of 45, in conjunction with ANT (Associazione Nazionale Tumori).

Furthermore, respondents emphasised other awards that recognise the company's commitment to social sustainability and stressed that Valmex engages proactively with local communities. This is achieved through collaboration with secondary schools and sponsorship of cultural events. One such event is the "Passaggi Festival" in Fano, a renowned cultural event in the region. At this event, the company promotes a dedicated section on gender equality.

However, despite these advantages, Valmex is confronted with several challenges in successfully conveying its sustainability endeavours to external stakeholders.

Challenges in Sustainability Communication. *Although Valmex communicates its sustainability initiatives with passion and dedication, its efforts could be more effective in engaging internal, local, and external stakeholders if supported by a sustainability communication plan. The current approach may not fully reach or resonate with key audiences, limiting the potential impact of its sustainability practices. As a result, Valmex risks missing opportunities to leverage its achievements as a competitive advantage, which could weaken the perceived value of its environmental and social initiatives and affect stakeholder perceptions and brand positioning.*

Another challenge for Valmex is strengthening the use of digital platforms to communicate its sustainability efforts more effectively. In contrast, many leading companies have shifted towards more dynamic, multi-channel communication strategies, utilising digital platforms, interactive content, and social media engagement to disseminate sustainability messages more effectively (Kaplan & Haenlein, 2010). The absence of a strong digital presence in Valmex's sustainability communication strategy limits its ability to connect with diverse stakeholder groups, particularly younger consumers and ESG-conscious investors, who increasingly rely on online platforms for corporate sustainability information.

Another significant challenge is the risk of greenwashing perceptions, a problem that was highlighted during the focus group discussions. Some respondents explained that the first annual sustainability report was not published on the website. The risk of greenwashing can erode stakeholder trust and diminish the credibility of a company's sustainability initiatives (Delmas & Burbano, 2011). To address this issue, Valmex must strengthen its sustainability reporting mechanisms by publishing this report and providing clear, verifiable, and data-backed evidence of its environmental and social impact.

Opportunities for Improvement. *In light of the challenges identified, the focus group discussions identified several key areas where Valmex could enhance its sustainability communication strategy in a significant manner.*

Implementing a well-structured communication plan is one of the most effective ways to enhance credibility and transparency. By leveraging a mix of communication channels that present data authentically and transparently, Valmex can strengthen stakeholder trust in its sustainability performance and reduce the risk of greenwashing concerns.

Another key area for improvement is the adoption of interactive sustainability communication through digital platforms, particularly social media. Research shows that investors, customers, and employees increasingly prefer digital, interactive formats that offer real-time updates on corporate sustainability efforts (Lamberton & Stephen, 2016). Valmex could leverage digital storytelling techniques to make its sustainability achievements more accessible and engaging, presenting milestones in a visually compelling and easily understandable way. The involvement of customers, suppliers, and local communities in a company's sustainability strategies has been demonstrated to enhance trust and to build long-term relationships based on shared responsibility (Pedersen et al., 2018). Furthermore, Valmex could develop an open sustainability forum where stakeholders can provide input, share feedback, and participate in decision-making processes related to environmental and social initiatives. This engagement would serve to reinforce the company's authenticity and commitment to meaningful sustainability efforts.

Finally, publishing annual sustainability reports is essential for fostering transparency and encouraging active stakeholder engagement and co-creation in sustainability communication. To address these challenges effectively, it is recommended that Valmex establish a cross-functional sustainability task force, including representatives from marketing, operations, human resources, and corporate social responsibility. This initiative would help ensure that sustainability messaging is cohesive, well-integrated, and strategically aligned with the company's overall goals.

Research limitations. *The present study is a work in progress and relies on a single case study, which is susceptible to inherent limitations concerning the generalizability of its findings. While the analysis of Valmex S.p.A. offers valuable insights into sustainability communication within the manufacturing sector, it is important to note that these insights may not be universally applicable across different industries or organisational contexts. The distinct characteristics of Valmex, including its corporate culture, market positioning, and stakeholder dynamics, may influence the applicability of the results to other settings.*

Moreover, while the focus group methodology is effective in eliciting detailed qualitative data, the number of participants in this study was limited. The limited sample size may not encompass the entire range of perspectives within the organisation, potentially overlooking divergent views or internal challenges related to sustainability communication. Furthermore, the composition of the focus group, which was primarily comprised of internal stakeholders, may introduce a bias, as the participants might be inclined to present the company's practices in a favourable light. The study also acknowledges the rapidly evolving nature of sustainability standards and stakeholder expectations. As the global emphasis on environmental, social, and governance (ESG) criteria intensifies, companies face increasing pressure to enhance transparency and accountability in their sustainability practices (Freeman et al., 2018). This dynamic landscape necessitates continuous adaptation and may affect the relevance of the study's findings over time. It is recommended that future research in this domain be informed by longitudinal studies that track changes in sustainability communication practices and stakeholder perceptions. Such studies would provide a more comprehensive understanding of trends and challenges in this area.

Managerial implications. *The findings from this study offer several preliminary critical implications for managers aiming to enhance their organisation's sustainability communication strategies. Firstly, there is a pressing need to integrate SC into the core business strategy, ensuring that it aligns with the company's overall mission and values. This integration fosters authenticity and strengthens stakeholder trust, as stakeholders are more likely to engage with organisations that demonstrate genuine commitment to sustainable practices (George et al., 2016).*

Secondly, it is incumbent upon managers to prioritise the development of a comprehensive SC strategy, including stakeholder engagement plans. Effective stakeholder engagement, as defined by Lane & Devin (2018), involves the dissemination of information in addition to the active involvement of stakeholders in decision-making processes. This, in turn, enhances the credibility and effectiveness of sustainability initiatives.

Thirdly, it is imperative to strengthen the utilisation of social media, interactive websites, and other digital tools that have the potential to augment the reach and impact of sustainability messages, making them more accessible and engaging for a diverse range of stakeholder groups. However, it is crucial to ensure that digital communications are not merely superficial but provide clear and verifiable information to avoid perceptions of greenwashing (Delmas & Burbano, 2011).

In conclusion, managers should foster a culture of continuous improvement and learning within their organizations. Encouraging feedback from stakeholders and being responsive to their concerns can lead to more effective and adaptive sustainability practices. This approach not only enhances the organization's reputation but also contributes to more sustainable business operations and long-term success.

Originality of the paper. *This paper contributes to the existing literature by examining sustainability communication within a manufacturing context - an area that has received relatively less attention in sustainability research. Through a case study of Valmex S.p.A-, it provides unique insights into the challenges and opportunities manufacturing firms face in communicating their sustainability efforts, particularly from the perspective of internal personnel. The study explores both the strategic and operational levels of sustainability communication, as well as both environmental and social dimensions of sustainability. It also explores the alignment between internal and external sustainability communications, highlighting the importance of consistency and coherence. This comprehensive approach addresses gaps in the literature, where most studies tend to focus either on strategic or operational levels or primarily on environmental sustainability (Braga et al., 2024).*

The employment of a single case dimensions study approach facilitates a detailed exploration of the specific organisational dynamics and stakeholder interactions that influence sustainability communication practices.

Furthermore, the integration of recent advancements in the domain of sustainability reporting, including the implementation of the Corporate Sustainability Reporting Directive (CSRD) by the European Union, situates the present study within the prevailing regulatory framework (European Commission, 2022). This contextualisation enhances the relevance of the findings for organisations navigating similar regulatory environments. The study also explores emerging challenges in sustainability communication, such as the phenomenon of greenhushing, where companies deliberately underreport their sustainability initiatives to avoid scrutiny, adding a contemporary dimension to the discussion (Lyon & Montgomery, 2015).

Moreover, the study emphasises the significance of aligning sustainability communication with corporate purpose and values, particularly in the context of external pressures and evolving political landscapes. This standpoint emphasises the necessity for companies to sustain their commitments to sustainability, even in the face of adversity, to ensure long-term resilience and success (George et al., 2016).

Key words: *sustainability communication (SC); environmental dimension; social dimension; B2B market; single case-study*

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From Loss to Gain: Rethinking Value Co-Destruction in Strategic Communication. Insights From the Banking Sector

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Abstract

This research reinterprets value co-destruction (VCD) as the effect of a strategic response by top managers to the urgency of digital transformation in the bank industry, viewing it as a temporary phase to overcome customers' innovation resistance and enabling long-term value co-creation (VCC). The study examines strategic VCD through the case of Intesa Sanpaolo's transfer of a business unit to its digital-only subsidiary, Isybank, without explicit customer consent. To assess the impact of this transition, a sentiment analysis of online reactions was conducted, tracking the evolution of negative sentiment from the transition phase to the post-transfer period as an indicator of VCD.

Findings suggest that Intesa Sanpaolo's possibly intentional VCD did not significantly threaten the banking group and ultimately led to positive outcomes for Isybank, including il successful transfer of many customers and the acquisition of new ones. Challenging the prevailing view of VCD as a negative outcome, this study offers new insights to the literature, demonstrating that, through the lens of strategic communication, VCD can be intentionally leveraged to change consumer habits, enabling them to adapt to technological advances and fully exploit the benefits of innovation, ultimately achieving VCC, especially when gradual innovation may be less effective. However, such strategies must be carefully implemented to mitigate reputational risks. Given its deductive approach, this research cannot confirm whether Intesa Sanpaolo's top management deliberately triggered VCD. Furthermore, the limited number of posts and comments may not fully capture customer perspectives on the transfer.

Framing of the research. *The digitalization process has caused significant disruption across all industries, introducing innovations that have profoundly transformed traditional business models and led to substantial shifts in consumer behavior (Zaman et al., 2023; Son et al., 2019), while also creating new opportunities for VCC (Hauke-Lopes et al., 2022).*

Within the financial sector, one of the most significant developments is the rise of digital-only banks (or Internet-only banks), which operate without physical branches and provide banking services exclusively through digital channels, such as online banking and mobile applications (Nel and Boshoff, 2021a). This innovation, which has experienced unexpectedly rapid growth-particularly due to the COVID-19 pandemic (Van Zeeland and Pierson, 2024)-has profoundly reshaped the operations of traditional banks (Haghighinasab et al., 2025) and altered conventional face-to-face interactions that have long defined VCC between consumers and firms (Lumivalo et al., 2024) fostering new forms of interaction through alternative, non-face-to-face virtual environments (Martovoy and Dos Santos, 2012).

This new business model provides customers with a broader range of services, often more efficiently than traditional offline banks (Bhatnagr et al., 2024), since they are accessible anytime and anywhere (Ahn and Lee, 2019; Park et al., 2024) at lower costs (Shin et al., 2020), while also reducing the time and effort previously required for in-person banking transactions (Park et al., 2024). From the banks' perspective, digital-only banks enable greater cost optimization by eliminating expenses of physical branches and offering more competitive services, while also expanding the breadth and depth of customer interactions, thus enhancing the VCC process (Lenka et al. 2017). As a result, digital-only banks can achieve a stronger competitive advantage over traditional banking competitors (Lee and Kim, 2020).

This makes the digital-only model attractive to traditional banks facing increasing pressure to stay competitive in a rapidly evolving industry shaped by new technologies and changing consumer expectations (Zao et al., 2022; Loureiro

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and Sarmento, 2018). Additionally, digital-only banks offer the advantage of significantly reducing operational costs, making them an appealing strategic shift for traditional financial institutions.

However, a key challenge to the widespread adoption and long-term success of digital-only banks is consumer resistance to innovation (Nel and Boshoff, 2021b) that may slow its diffusion, hinder acceptance, and ultimately threaten its long-term sustainability (Lee and Kim, 2020).

The literature has mainly focused on why consumers struggle to transition from traditional to digital-only banks. Nel and Boshoff (2021a, 2021b) identified key barriers such as (1) the perceived inferior quality of digital-only bank services compared to traditional banks and (2) the unfamiliar behavioral patterns required, which may conflict with customers' existing banking habits. Others noted that satisfaction with traditional banks creates resistance to change, hindering the shift to digital-only banks, even if they offer greater benefits (Nel and Boshoff, 2023; 2021b).

However, another critical issue concerns how firms introduce such innovations to the market. According to Hauke-Lopes et al. (2022) and Malar et al. (2019), not all digital disruptions lead to positive outcomes and VCC. In some cases, they may result in VCD, particularly when trust is lacking, communication with customers is unclear, or when firms fail to effectively convey the benefits of the innovation.

The successful introduction of innovations requires companies to focus not only on their promotion but also on ensuring their understanding, implementation, and acceptance, which are managed through strategic communication. Zerfass and Huck (2007) emphasize that this is a key function of strategic communication. This omnidirectional, diachronic process (Van Ruler, 2020) integrates business functions and engages stakeholders to support the development, execution, and evaluation of corporate strategies, ensuring alignment with organizational goals (Hallahan et al., 2007). A key element is structured listening to identify societal changes and shifting stakeholder expectations, which inform executive decision-making and strategy (Siano et al., 2015; Invernizzi and Romenti, 2011). In the case of traditional banks introducing fully digital services, reflective communication plays a crucial role in determining whether the innovation leads to VCC orVCD, directly influencing the success or failure of the strategy (Hauke-Lopes et al., 2022).

Therefore, the way traditional banks introduce fully digital banking services is through reflective communication, where the outcome-whether it fosters VCC or leads to VCD-ultimately shapes the success or failure of the innovation introduction strategy (Hauke-Lopes et al., 2022). However, in the current context, traditional banks are at the center of a complex interplay of forces. While the digital-only model can improve performance, enhance customer satisfaction, expand opportunities for VCC, and help banks navigate growing competitive pressures driven by digitalization, it also requires them to address consumer resistance to innovation and the risk that a fully digital transition could lead to VCD. Despite the relevance of this issue, recent literature has paid little attention to the strategies firms can adopt to mitigate these challenges while simultaneously leveraging supportive factors from a strategic communication perspective.

Purpose of the paper. *The urgency to remain competitive, to keep pace with technological advancements, and the consumers' resistance make it challenging to quickly implement a strategy that ensures VCC and enhances the well-being of all stakeholder systems involved. However, we argue that framing the transition solely in terms of co-creation or co-destruction oversimplifies the complexity of introducing a digital-only bank in today's banking landscape.*

According to several authors, VCC arises from a resource integration process that aligns with actors' expectations, enhancing their well-being (Plé, 2016; Vargo and Lusch, 2008). Conversely, VCD arises from factors such as resource misuse (Plé and Chumpitaz Cáceres, 2010), conflictual resource integration (Echeverri and Skålén, 2011), or resource loss (Smith, 2013), all of which result in a reduction in the well-being of at least one of the interacting parties. Moreover, from the S-D Logic perspective on service innovations, this resource integration process is what enables the emergence of new resources or new interaction patterns, ultimately facilitating and enhancing VCC itself (Lusch and Nambisan, 2015).

Therefore, since digital-only banks adoption requires a shift in behavioral patterns related to service usage (Nel and Boshoff, 2021a), customers who face this change must integrate new resources or modify existing resource integration processes, even though the previous condition already enabled them to co-create value. As a result, we could hypothesize that in some cases, innovation-including the transition from traditional to digital-only bank-inevitably leads to a temporary decline in the well-being of the interacting parties. However, this decline could be interpreted as a necessary phase, allowing new resources and new integration methods to be internalized by the interacting systems. In the long term, this adaptation could enable a higher level of well-being compared to the pre-innovation stage, ultimately fostering greater VCC. If VCD could be a possible consequence of introducing innovation, the real challenge lies in overcoming the barriers that hinder its adoption, which, from a strategic communication perspective, depends on organized listening activities and reflective communication. In highly dynamic contexts where a gradual transition may be less profitable, due to increasing competitive pressures coupled with barriers that prevent consumers from embracing change, reflective communication activities may force traditional banks to a more disruptive approach to breaking down these barriers, intentionally inducing VCD to facilitate greater co-creation in the long run.

Therefore, this study aims to explore how strategic communication can lead top management to choose to implement the forced transition of consumers from traditional banking services to a digital-only model in order to accelerate the acceptance of digital innovations in the banking sector that while could result in a short-term increase in VCD, it may ultimately be a necessary step to unlock the long-term co-creation opportunities offered by digital-only banks.

To this end, we use the Italian case of Intesa Sanpaolo's transfer of predominantly digital customers to its digital-only bank (Isybank) without explicit customer consent. The transition was made using a communication strategy that neither clearly communicated the transfer nor provided customers with an easily accessible opportunity to oppose it. The

case sparked considerable controversy among consumers, but Isybank itself framed the operation as a success, despite the reputational damage suffered. In this context, the VCD for transferred customers can be attributed to the absence or inadequacy of communication from the banking group (Smith, 2013; Järvi et al., 2018) that may have been a deliberate strategic choice. By limiting customer awareness of the implications of the transfer, the bank potentially overcame resistance to innovation, ensuring the adoption of a digital-only model that is considered essential for the sector's long-term development (Lee and Kim, 2020). For the purpose of this paper, we assume that the voluntary VCD by Intesa Sanpaolo may have been driven by the top management's organized listening activities: noticing the rapid growth of digital-only banks in Europe and the need to remain competitive (Statista, 2025; European Central Bank, 2021), and considering Italy's low digitalization rate (ISTAT, 2023), the company likely decided to leverage, even if it required a more forced approach, the segment of Italian users already familiar with digital platforms to innovate and stay competitive in the sector.

Thus, to determine whether this forced transition resulted in short-term VCD to enable long-term VCC, we will employ a sentiment analysis using negative sentiment as a proxy for a decline in well-being-and thus an indicator of VCD. This will allow us to examine whether, over time, negative sentiment decreases while positive sentiment increases, signaling a shift toward the acceptance of digital-only banking.

Methodology.

The Intesa Sanpaolo-Isybank case

As part of its digital transformation strategy, Intesa Sanpaolo, a leading Italian banking group, launched Isybank, its digital-only bank, in June 2023. It involved the automatic transfer of over 2 million Intesa Sanpaolo customers to Isybank in two phases: 300,000 customers were transferred in October, while the remaining ones moved in March, without their explicit consent, generating significant dissatisfaction. A critical aspect concerned Intesa Sanpaolo's communication strategy regarding the transition. Customers reported that the information was disseminated solely through the bank's online platform and mobile app, with minimal emphasis and during the summer holiday period, failing to effectively convey the significance of the change. As a result, many customers remained unaware of the transfer and only discovered it after the deadline to oppose it had passed, often finding that their contractual terms and services had changed (Forbes, 2024). In November 2023, the Italian Antitrust Authority ruled that this communication strategy was misleading and aggressive, allowing the first tranche to revert to their original contract and requiring explicit consent for the second. Another key aspect is that the bank strategically selected a segment of customers for the transfer. Those affected were classified as "predominantly digital customers", meaning they were under 65, had never visited a physical branch or did so occasionally, held assets below €100,000, and did not own complex financial products or insurance policies. By targeting customers who already relied on digital banking, Intesa Sanpaolo aimed to optimize costs and increase profitability, assuming minimal friction in transitioning to a fully digital service. This strategic selection may explain why complaints focused on the transition process rather than on Isybank services.

Finally, over a year after the event, Intesa Sanpaolo reports satisfaction with the outcomes, with approximately 350,000 customers successfully transferred and over 500,000 new accounts opened (Wired, 2023).

Sentiment Analysis

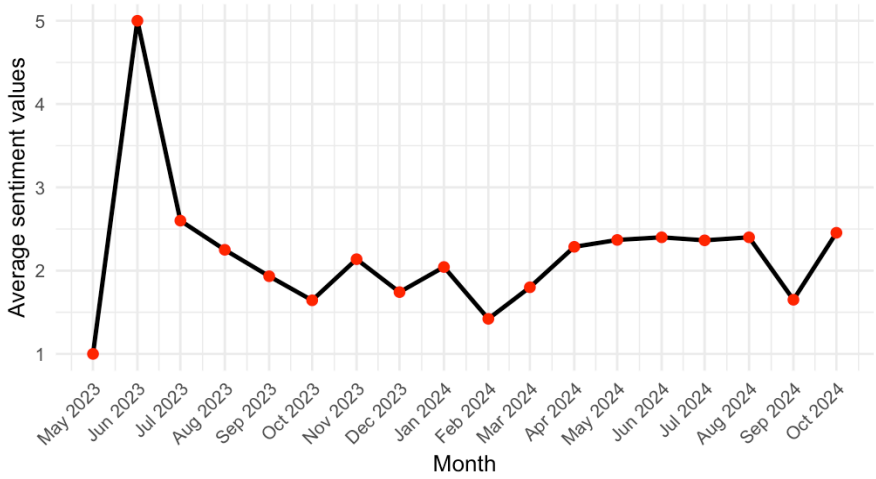
For the purpose of this study the evaluation of both VCC and VCD levels is assumed to reflect customer satisfaction with the transition to Isybank and the new fully digital service. Several scholars have linked the concept of VCC to customer satisfaction, considering it a key determinant of co-creation and identifying a positive relationship between satisfaction and VCC (Vega-Vasquez et al., 2013; Cambra-Fierro et al., 2018).

This relationship allows us to employ sentiment analysis as a method, given that it has been widely used to assess customer satisfaction levels (Andrian et al., 2022). Sentiment analysis is defined as the computational study of people's opinions, attitudes, and emotions toward entities, and it enables the identification of sentiment polarity within text data that consumers spontaneously publish on blogs, forums, and social networks. This research method is particularly suitable for this study due to the high media resonance of the case and the large number of customers involved in the transition from Intesa Sanpaolo to Isybank. The analysis of online discussions regarding the forced migration provides a substantial amount of data, allowing for a more precise examination of the phenomenon.

At this exploratory stage of the research, we analyzed 1,191 posts, comments, and reviews from customers involved in the transition, collected across online forums (Telefonino.net, Fibraclick Forum), review platforms (Trustpilot), and social media (Reddit, Facebook). Among the various sentiment analysis approaches, we adopted the Bidirectional Encoder Representations from Transformers (BERT) model, which has been identified by Alparthi and Mishra (2021) as highly effective for sentiment classification tasks. BERT processes text in a bidirectional manner, analyzing the context both before and after each word in a sentence, thereby improving text comprehension and enhancing sentiment analysis accuracy. The model's output quantifies sentiment on a five-point scale from 1 (very negative) - which reflects high dissatisfaction and so, VCD - to 5 (very positive) that signifies maximum satisfaction and thus, VCC.

This methodological approach enables a data-driven assessment of customer sentiment regarding the migration to Isybank, providing valuable insights into the extent of VCC and VCD in this transition.

Results.



Preliminary findings of this study, covering the period from May 2023 to October 2024, reveal several insights. During May and June-when customers could still exercise their right to withdraw-sentiment was highly positive. This suggests that more attentive customers, who systematically used digital channels, became aware of the transition early and responded favorably to the initiative.

However, around the withdrawal deadline in July, sentiment dropped sharply and remained consistently below an average value of 2.5. From March 2023 onward, sentiment values showed a slight upward trend. This shift may be attributed to multiple factors: first, the precautionary measure issued by the Italian Antitrust Authority, which required explicit consent for the transfer, leading to a decline in negative comments about the forced migration. Additionally, users who had already been transferred may have started to appreciate the fully digital service.

The slight decline observed between August and September 2024 could reflect dissatisfaction among some customers following the completion of the second transfer phase. However, sentiment stabilized from October onward, returning to the levels recorded between April and early August.

Overall, a preliminary analysis of posts and comments indicates a highly negative sentiment during the forced transfer period (May 2023 to March 2024), followed by a gradual improvement in the subsequent months. This trend suggests initially high levels of VCD, with a slight upward shift that could hint at a move toward increased satisfaction, potentially associated with VCC. However, due to the limited timeframe and the relatively small sample of posts and comments analyzed, at this stage it is still not possible to determine whether the negative sentiment observed is merely temporary.

Research limitations. *The analysis conducted is based on a deductive approach, as no feedback was received from the Intesa Sanpaolo group regarding the actual dynamics that led the top management to choose these specific transfer methods. Therefore, we defer the identification of the drivers behind this more aggressive approach to the introduction of the innovation to future developments of the research.*

Moreover, using BERT for sentiment analysis requires training on large corpora, and given that our dataset is relatively small, its performance may be compromised potentially resulting in inaccurate interpretations of the analyzed sentences (Alapharti and Mishra, 2021) and a constrained understanding of the overall patterns.
Additionally, the analysis did not consider the topics discussed in the individual posts and comments analyzed. Therefore, future developments of this paper should not only incorporate a larger sample but also include a more in-depth examination of the discussed topics through textual analysis. This would help separate complaints related to the transfer itself from those related to dissatisfaction with the services offered by Isybank.

Managerial implications. *Our findings suggest that the forced transfer initiated by top management led to substantial customer dissatisfaction, resulting in significant VCD. Notably, this process did not appear to transition into VCC at least within the period analyzed as evidenced by the predominantly negative sentiment observed. Although a slight improvement in sentiment was detected over time, it remained below the neutrality threshold even more than a year after the event. Moreover, the transfer itself does not seem to have yielded positive results, as out of 2 million transferred customers, only 17.5% ultimately accepted the transition (laRepubblica, 2025).*

For the affected customers, the approach adopted by top management appears to have triggered high levels of VCD, attributable to multiple factors. Beyond the voluntary hidden communication strategies that failed to adequately inform customers about the transfer, the process likely fostered a loss of trust and an imbalance of power-where customers felt deprived of their ability to choose where to manage their financial assets. These elements, recognized as key drivers of VCD (Järvi et al., 2018; Vafeas et al., 2016), may have further intensified negative sentiment toward Isybank. As a result, the reputational damage suffered by Intesa Sanpaolo risked extending to its newly established digital-only bank, potentially discouraging customer engagement with innovative financial services and hindering the broader adoption of digital banking solutions.

From a customer relationship management perspective, this strategy likely weakened long-standing relationships with some customers. While not all dissatisfied customers abandoned Intesa Sanpaolo-some reopened their-the approach represents a missed opportunity for customer retention and long-term loyalty. Given the increasing competitiveness of the banking sector, fostering strong customer relationships is essential to enhancing commitment and reducing churn (Wongsansukcharoen, 2022; Ganaie and Bhat, 2020). Consequently, forcing the transition as a mechanism to drive innovation adoption seems to have backfired, partially failing to preserve prior investments in customer retention strategies.

However, an alternative perspective suggests that this situation may have generated certain positive outcomes. The extensive media attention surrounding the event may have contributed to heightened awareness of Isybank, attracting new customers intrigued by the digital-only banking proposition. This is supported by data indicating that Isybank acquired approximately 500,000 new customers within a few months of its launch. In this sense, the dissatisfaction of some customers may have inadvertently created an opportunity to strengthen brand visibility and facilitate future VCC with new adopters.

Despite these mixed outcomes, our findings highlight key managerial considerations for future strategic decision-making, particularly in strategic communication for digital transformation initiatives. A critical issue was that the forced migration involved a digital-only bank that initially lacked several essential services typically offered by Intesa Sanpaolo. Research on digital banking adoption (Park et al., 2024; Rogers, 2010) emphasizes the importance of perceived compatibility, which refers to the alignment between new services and customers' existing banking habits. The absence of key functionalities likely weakened this alignment, increasing customer resistance. This underscores the need for organizations implementing aggressive strategies to ensure that digital offerings provide at least an equivalent level of service to traditional banking alternatives.

Additionally, the communication strategy failed to effectively highlight the relative advantage of the digital bank, seemingly assuming that customers would recognize its benefits only after adoption. Our partial findings suggest that this assumption has not held so far, as dissatisfaction persisted over time. This highlights the importance of proactively conveying the benefits of digital transformation, rather than relying on post-adoption experiences to drive customer acceptance.

Furthermore, research suggests that allowing potential customers to experience a digital-only bank before full adoption significantly increases the likelihood of innovation acceptance (Park et al, 2024; Rogers, 2010). From this perspective, an alternative approach could involve implementing a forced temporary trial period, where customers are introduced to the new service with the option to revert to their previous banking arrangement. Such an approach may help alleviate concerns about the transition, enabling customers to objectively evaluate the benefits of digital-only banking without feeling coerced into an irreversible change.

In conclusion, future top managers navigating similar challenges may still opt for aggressive transition strategies but should take appropriate precautions to limit VCD exclusively to the resource reallocation phase, rather than allowing it to extend to broader aspects such as loss of trust in the institution itself. In this regard, we encourage top management to place greater emphasis on organized listening activities, particularly in the post–forced transition phase. Such process, aimed at supporting reflective communication practices, can help mitigate excessive VCD through timely and targeted interventions. This approach could facilitate a faster recovery in terms of VCC, ultimately increasing the likelihood of a successful digital transformation.

Originality of the paper. *This study provides several insights into the literature on VCC and co-destruction, the digitalization of the banking sector-particularly the introduction of digital-only banks-and strategic communication.*

First, it expands the concept of intentional VCD as Plé and Chumpitaz Caceres (2010) originally defined this as the deliberate misuse of resources by one service system to gain an advantage in VCC at the expense of others. However, by analyzing the role of strategic communication, this study introduces a new perspective, suggesting that VCD is not merely a negative outcome but can serve as a temporary phase that enables greater VCC in the long term, particularly in the context of innovation introduction. In this regard, understanding social and market dynamics by the top management may lead banks to adopt a more assertive strategic approach that could help prevent stagnation in the banking sector and reduce consumer resistance to innovation. This dynamic is particularly evident in the banking sector, where only through high-level digitalization can banks achieve key benefits such as faster execution, further cost reductions, streamlined decision-making, enhanced innovation through new products, and greater customer trust through fraud protection systems, more effective customer identity verification, anti-money laundering measures, and more accurate credit risk analysis (Davenport and Mittal, 2023). These benefits, in turn, would provide a valid justification for the top management's decision to trigger temporary VCD to pave the way for improved results in the future for both banks and their customers

Furthermore, this study explores a case that has received limited attention in the academic literature despite widespread media coverage. The visibility of this case provides an opportunity to analyze consumer opinions in spaces outside the control of Intesa Sanpaolo, offering a clearer understanding of the levels of VCC and co-destruction experienced by customers transferred to Isybank. However. to further validate our assumptions, we recommend conducting additional sentiment analysis over time to confirm the presence of a significant increase toward a more positive sentiment. Having already observed a slight improvement in sentiment in our preliminary data, despite it still being indicative of VCD, if further measurements register an increase in sentiment, they will be interpreted as a rise in

VCC, confirming VCD as a temporary phase in response to the aggressive strategy implemented by the Intesa Sanpaolo Group to introduce their new fully digital banking service.

Key words: *Digital-only banks, FinTech, Strategic Communication, Value Co-Destruction*

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Strategic Brand Management in Luxury Tourism: A Multimodal Discourse Analysis of Mangia's Online Communication

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Abstract

Luxury tourism is shifting from material opulence to experiential consumption, where exclusivity is defined by authenticity, immersion, and emotional connection. This study examines multimodal online communication in luxury brand management, analysing how verbal and visual elements on Mangia's official website construct a persuasive narrative and reinforce the brand's exclusivity. Drawing on Dann's (1996) rhetorical framework, the study identifies key verbal, visual, and combined techniques used to shape the brand's identity and frame luxury tourism. The findings reveal that multimodal discourse enhances the experiential value, aligning with contemporary luxury tourism trends. However, as a preliminary study, the analysis is limited to the website's homepage, with future research extending to social media platforms to further assess how multimodal discourse contributes to strategic brand management in luxury tourism. The study offers managerial insights, emphasising the importance of multimodal strategies in communicating the exclusivity and authenticity of luxury tourism experiences.

Framing of the research. *Luxury tourism is a dynamic and evolving niche market that reflects wide-ranging societal trends towards experiential consumption. Traditionally associated with opulence and exclusivity, luxury is increasingly defined by unique and immersive experiences that align with the personal values and aspirations of affluent tourists (Iloranta, 2021; Kemp & Dłużewska, 2023). This shift suggests that luxury tourism is not merely about high spending but also about fostering memorable moments that enhance personal well-being. As Iloranta & Komppula (2021) argue, luxury tourism has the potential to lead the post-pandemic recovery of the hospitality and tourism industry by attracting high-spending visitors and contributing to economic resilience and market development (Thirumaran & Raghav, 2017).*

The motivations driving luxury tourism consumption are multifaceted and segmented. Zhang et al. (2022) highlight that luxury travellers are not a homogenous group but consist of diverse segments with distinct travel planning behaviours. Perceptions of quality and exclusivity are often shaped by social and financial expectations, with travellers seeking experiences that enhance both social status and personal identity (Marcão et al., 2024). Hung et al. (2018) further emphasise the experiential dimension of luxury tourism, noting that social media interactions, experiential value, emotional connections, gamification, and brand community identification all play vital roles in shaping how consumers perceive and interact with luxury brands.

Social identity also plays a crucial role in shaping consumer choices. In many cultures, luxury experiences serve as status symbols, reinforcing social belonging (Jiang & Shan, 2018). Yang & Mattila (2013) argue that status-seeking behaviours influence consumer preferences, with luxury tourism offerings often functioning as markers of exclusivity and prestige. This aligns with research by Lai et al. (2022) and Shukla et al. (2016), who state that consumers engage in conspicuous consumption to enhance their social standing, aligning themselves with brands that symbolise prestige and exclusivity.

Beyond social identity, emotional connections to luxury brands further reinforce consumer engagement. Peng & Chen (2019) assert that strong emotional attachments to luxury hotel brands increase repurchase intention, while Hyun & Kim (2012) demonstrate that rapport-building in luxury restaurants fosters deeper brand attachment. This suggests that personalised service is not merely an operational component but a critical factor in sustaining long-term consumer satisfaction and loyalty. Given the significance of emotional engagement in consumer-brand relationships, luxury brands must develop communication strategies that reflect evolving consumer expectations rather than relying on standardised messaging.

However, many luxury brands continue to rely on standardised communication strategies that fail to address the complexity of evolving consumer mindsets (Mušanović et al., 2023; Seo et al., 2019). In an increasingly digitalised landscape, brands must craft compelling narratives that resonate with affluent consumers on a deeper level. Digital platforms have emerged as essential tools for constructing these narratives, allowing brands to create aspirational images, reinforce exclusivity, and foster community engagement. Given that brand perception is shaped not only by

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functional attributes but also by symbolic and experiential dimensions (Kowalczyk & Mitchell, 2021; Peng & Chen, 2019), a deeper exploration of online brand communication is warranted. Conte et al. (2024) stress that the development of a distinctive and robust brand identity is fundamental to the brand-building process: organisations define the components of their brand identity internally and subsequently convey it externally to shape a desired brand image, reputation, and a cohesive understanding of the brand among stakeholders.

In the digital era, luxury tourism branding has become increasingly multimodal, integrating linguistic and visual elements to craft compelling brand narratives (Thirumaran et al., 2021). Digital platforms play a pivotal role in creating a sense of exclusivity and community among affluent consumers, influencing both brand engagement and travel decisions (Giglio et al., 2020). The visual nature of websites and social media, for instance, enhances engagement by reinforcing aspirational luxury experiences. Effective luxury branding, therefore, extends beyond purely verbal communication to encompass multimodal strategies that shape consumer perceptions and interactions with luxury tourism brands (Lai et al., 2022).

Multimodality is a set of diverse, yet related approaches to the study of how meaning is created through the interaction of different semiotic resources (Jewitt et al., 2025). It is particularly relevant to brand communication in digital contexts, where the strategic interplay of semiotic systems is essential in shaping an effective brand identity. Kress (2010) refers to semiotic systems as 'modes', defining them as 'socially shaped and culturally given resources for making meaning' (p. 79). Studying brand communication from a multimodal perspective provides deeper insights into how brand narratives are constructed and perceived in the digital space.

Despite the growing recognition of multimodal strategies in digital branding, little research has examined how luxury tourism brands leverage multimodal discourse to construct their online identity and reinforce exclusivity. Additionally, significant gaps remain in understanding the communication strategies employed by luxury tourism brands (Carrasco-Santos et al., 2023). Iloranta (2021) highlights that much of the existing literature is dominated by quantitative approaches, often overlooking qualitative insights. By examining the interplay of verbal and visual elements, this study aims to deepen the understanding of how luxury tourism brands construct their online identity, influencing consumer perceptions and reinforcing exclusivity through multimodal discourse. Specifically, this paper investigates the case of Mangia's, an Italian luxury hospitality brand operating in Sicily and Sardinia, to explore how its multimodal communication strategies shape brand identity and frame luxury tourism on its official website (http://www.mangias.com/en).

Purpose of the paper. *The purpose of this study is twofold: on the one hand, it investigates how a luxury hospitality brand employs multimodal rhetorical strategies to construct its identity online; on the other hand, it examines how luxury tourism is framed through persuasive storytelling. Using Mangia's as a case study, the paper explores how verbal and visual elements on its official website contribute to a cohesive brand narrative on luxury tourism that communicate exclusivity, authenticity, and experiential value. The overall objective of this research is to analyse the brand's multimodal communication across both its official website and social media platforms. However, as this paper is a preliminary version, the analysis presented here focuses solely on the website.*

Methodology. *The present study draws on the rhetorical framework developed by Dann (1996), a foundational model in tourism discourse analysis that is particularly insightful for examining how persuasive meaning is shaped in hospitality branding. The framework includes three categories of rhetorical techniques:* ***verbal*** *(i.e. comparison, key words and keying, testimony, humour, languaging, and ego-targeting),* ***visual*** *(i.e. colour, format, visual cliché, and connotation procedures), and* ***combined*** *(i.e. puzzles, temporal contrast, collage, ousting the competition, infraction of taboo, and significant omission). This approach is particularly well suited for analysing how language and imagery are strategically integrated to communicate exclusivity and authenticity in tourism experiences.*

The choice to rely on Dann's framework at this stage is deliberate. As the goal is to analyse how traditional rhetorical strategies are recontextualised in digital storytelling, Dann offers a systematic, discourse-oriented lens that reveals the underlying persuasive logic of multimodal content. This methodological choice is not intended to exclude more recent developments (e.g. Kress & van Leeuwen, 2020). These perspectives will inform the next stage of the research, which will expand the analysis to social media and integrate more recent approaches to digital multimodality.

By starting from a foundational rhetorical model, this preliminary analysis offers a structured entry point into the study of multimodal digital brand discourse in luxury hospitality.

Results. *The homepage of Mangia's official website features a dynamic headline including two videos that play sequentially. In the middle of each video, a key slogan appears, summarising the scene's message. The first video (Figure 1) constructs a compelling multimodal narrative that merges dreamlike visuals with emotionally evocative verbal techniques. The use of photogenia (Barthes, 1982) entails soft, ethereal lighting that frames the experience as an almost mythical escape from the ordinary. The color palette creates an almost surreal atmosphere, reinforcing the aspirational and exclusive nature of the luxury tourism experience. The hazy lighting and softened edges contribute to a dreamlike quality, subtly distancing the viewer from reality and placing them in an idealised version of a Mangia's resort. The video employs large, Italian-style rectangular frames that highlight breathtaking landscapes and high-end hospitality services, ensuring that every scene is meticulously crafted to evoke indulgence and relaxation.*

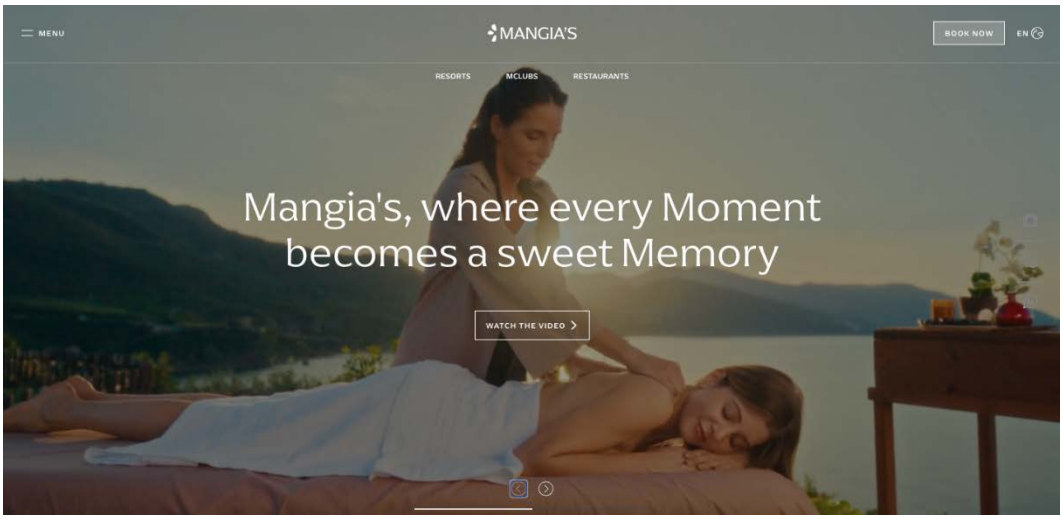
The video also features the staff of the resort engaged in their work, highlighting various hospitality roles such as gardening, mixing a cocktail, setting up the room, plating a dish, welcoming a guest at the check-in, arranging the restaurant, and organising the external pool area. Among the most visually striking moments is an outdoor spa treatment, where the setting highlights the natural landscape while paradoxically incorporating very indoor-looking furnishings,

further reinforcing the dreamlike, hypercurated luxury experience. The massage therapist's attire also stands out-it is noticeably different from a typical service-worker uniform, blending seamlessly with the setting to contribute to the video's fantasy-like aesthetic rather than a traditional hospitality scenario. Concluding the video with close-up shots of key staff members-including the housekeeper, chef, barman, lifeguard, and receptionist-humanises Mangia's brand identity, fostering a sense of authenticity and connection.

This surreal, highly polished visual scene is further enhanced by the video's verbal techniques, which construct a powerful emotional connection with potential tourists. The slogan appearing mid-video employs comparison to highlight the uniqueness of the Mangia's experience, positioning it as a transformative journey that turns moments into 'sweet memories'. This metaphor appeals to emotions associated with nostalgia, joy, and exclusivity, reinforcing the contemporary shift in luxury tourism towards experiential consumption. The narrative emphasises how the experience at Mangia's transcends reality, creating a new, idyllic version of life that guests can only access through this exclusive brand. Furthermore, by using significant omission, the video avoids showcasing any logistical or practical aspects of the resort experience, such as crowded areas, instead maintaining the illusion of a flawless, private dream world.

The video employs a multimodal discourse that is aspirational, emotional, and immersive. It appeals to affluent tourists who seek not only exclusivity and prestige but also the transformative power of a hypercurated, almost surreal luxury experience. Through its dreamlike aesthetic and emotionally engaging messaging, Mangia's positions itself as a gateway to a world where luxury transcends reality, offering guests an unparalleled, once-in-a-lifetime experience.

Figure 1. Homepage of Mangia's Official Website: Video 1



The second video (Figure 2) adopts a more grounded yet equally immersive approach, shifting from surreal dreamscapes to a narrative that emphasises an authentic and refined luxury experience. The color scheme harmonises warm and cool tones, reflecting a balance between relaxation and vibrant activities. The format relies on large, Italian-style frames that showcase landscapes, resort amenities, and intimate moments, reinforcing the exclusivity of Mangia's brand by crafting a highly immersive Italian experience. The video incorporates visual storytelling by following a chronological structure that portrays a typical day at Mangia's resorts. It begins with the moment the guest wakes up and continues by showcasing a seamless flow of experiences designed for relaxation and indulgence. The sequence unfolds with breakfast on the balcony, an invigorating outdoor shower under the sun, sunbathing and swimming, spending time at the beach, enjoying an aperitif by the sea or on a terrace at sunset, having dinner, and ending the day by joining a festive local celebration. This structured narrative highlights how Mangia's offers a perfectly curated day of leisure, catering to guests who seek effortless luxury from morning to night. The video strongly emphasises how every part of the guest's day is thoughtfully orchestrated, ensuring a seamless transition from one luxurious moment to the next. The use of photogenia ensures that each moment is visually polished, reinforcing the aspirational nature of the experience. Every activity is depicted with careful attention to detail, evoking a sense of exclusivity and indulgence that defines Mangia's brand.

This highly immersive visual scene is reinforced through the video's verbal techniques, which deepen the sense of emotional connection. The slogan appearing within the video highlights the authenticity of the experience being offered. The use of code-switching in 'the authentic Italian vacanza' strengthens the cultural richness and legitimacy of the brand experience, making the audience feel as though they are not just visiting Italy but fully immersing themselves in its traditions, daily rhythms, and refined elegance. Additionally, 'live a love like Italy' adds another emotional layer, evoking themes of romance and relaxation, aligning with luxury travellers' desires for a carefully curated and meaningful escape.

By integrating visual and verbal elements, this video effectively reinforces Mangia's brand identity as a leader in luxury tourism that offers a rich, diverse, and indulgent guest experience. The multimodal approach ensures that the aspirational and emotional aspects of tourism are highlighted, catering to affluent consumers who prioritise seamless luxury, exclusivity, and effortless enjoyment in their holiday choices. Through its carefully crafted combination of sensory

and emotional appeal, the video presents Mangia's resorts not just as luxury accommodations but as destinations where every moment is curated to provide an authentic Italian experience.

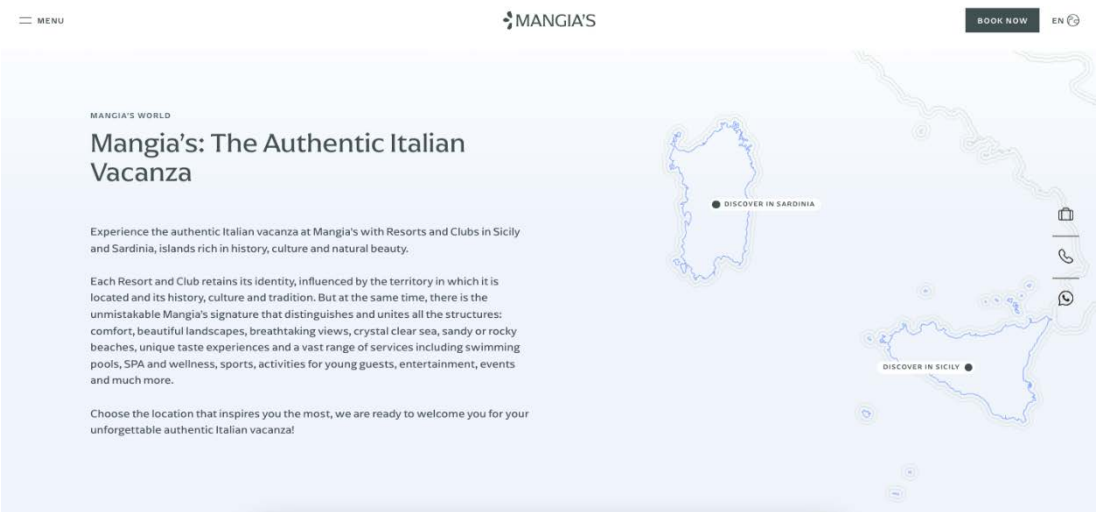
Figure 2. Homepage of Mangia's Official Website: Video 2

In the Mangia's World section (Figure 3), the use of the map of Sicily and Sardinia as the primary visual element is a striking choice that enhances the brand's luxurious entity. The minimalist design of the map, with its simple blue and white colour scheme, invokes a sense of sophistication, aligning with the luxury brand's positioning. Colour is used to convey serenity and elegance, and the clean lines and simplicity of the map's design add to the idea that these destinations are refined and untouched by commercialisation. The format of the image is rectangular, focusing the viewer's attention solely on Sicily and Sardinia as the primary destinations. The map's depiction of geographical locations without imagery of lush landscapes or tourist-heavy visuals reinforces the idea that these destinations are exclusive, not overcrowded or cliché.

From a verbal perspective, the repetition of 'authentic' solidifies the notion that the experience offered is true to Italian traditions, setting Mangia's apart from other luxury brands. 'Unmistakable Mangia's signature' serves as a guarantee, emphasising the brand's authority and trustworthiness. The call to action 'choose the location that inspires you the most' personalises the message, making the addressee feel empowered to select their ideal destination.

The combination of these visual and verbal techniques creates a cohesive narrative. The minimalist map encourages the viewer to imagine the beauty and exclusivity of Sicily and Sardinia, with the accompanying text guiding the addressee's perception towards a sense of luxurious discovery.

Figure 3. Homepage of Mangia's Official Website: Mangia's World Section



The resorts section (Figure 4) uses visual techniques to convey a sense of space, serenity, and high-end leisure. The expansive panorama of the resorts' surroundings, with lush greenery and tranquil waters, instantly evokes feelings of relaxation and escape. The warm golden tones of the sunlight suggest a peaceful, luxurious experience, highlighting the resorts' connection with nature and tranquility. This aligns with visual clichés of luxury tourism, using pristine landscapes and idyllic scenery to enhance the perception of these resorts as idealised escapes.

The 'authentic Italian experience' is again verbally emphasised, stressing that the resorts are distinctive not only by their locations but by their connection to the cultural essence of Sicily and Sardinia. The phrase 'unique locations' adds further prestige, reinforcing the perception of exclusivity and high quality. Additionally, 'live the authentic Italian vacanza' and 'enjoy moments of relax and adventure' speak directly to the addressee's personal experience, offering them the opportunity to immerse themselves in a high-quality, culturally rich experience.

The multimodal narrative appears persuasive, appealing to the addressee's desire for peace, luxury, and authenticity. The stunning imagery is not merely a scenic view but a carefully crafted representation of the experience the brand is offering, supported by the brand's verbal messaging that positions Mangia's resorts as an exclusive and enriching choice.

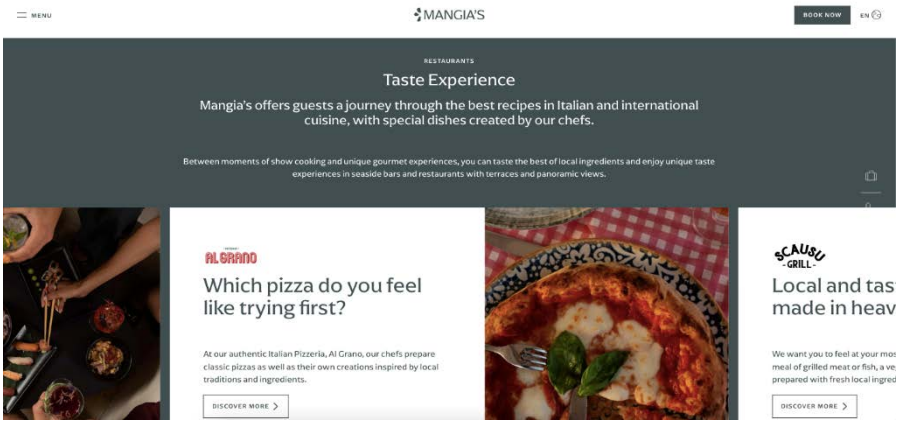
Figure 4. Homepage of Mangia's Official Website: Resorts Section

In the restaurants section (Figure 5), the image of a pizza dish serves as an enticing visual that underscores the brand's commitment to authenticity and quality. The vibrant colours of the ceramic-made dish and the pizza evoke warmth, freshness, and traditional Italian flavours. These visual clichés immediately connect the viewer with Italian culture, reinforcing the authenticity of the dining experience. The close-up format of the image brings attention to the textures and ingredients, conveying a sense of high-quality craftsmanship. The colour used in the dish itself is vivid, which not only makes the food appear appetising but also suggests an inviting, luxurious meal experience. The image of sushi emphasises the international food offering of the brand.

The phrase 'best recipes' functions as a key word, capturing the reader's attention by suggesting that only the finest food experiences are offered. The term 'journey', used as a metaphor, adds an experiential dimension to the dining experience, indicating that it is more than just a meal; it is an adventure that promises to satisfy both the body and the senses. The reference to 'special dishes created by our chefs' invokes the authority of the chefs and the expertise behind the meals. This could be interpreted as a subtle endorsement, inviting potential guests to trust the culinary prowess of Mangia's. The sentence 'you can taste the best' appeals directly to the addressee, making the message more engaging, while 'which pizza do you feel like trying first?' brings in an element of humour.

The visuals of fresh, high-quality food, combined with text emphasising culinary authenticity and expertise, create a compelling image of Mangia's as a brand that embodies both luxury and the essence of Italian dining. This combination engages the addressee's senses and emotions, transforming the meal into a multisensory journey of taste and culture.

Figure 5. Homepage of Mangia's Official Website: Restaurants Section

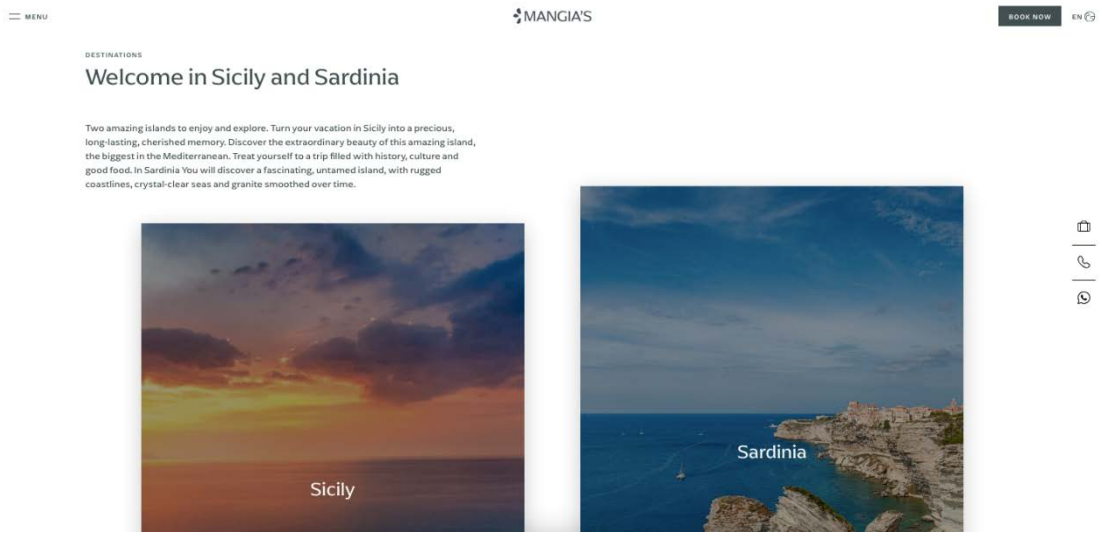


In the destinations section (Figure 6), the imagery of a sunrise over Sicily and a clear coastal view of Sardinia creates an idealised, tranquil representation of these islands. The warm hues of the sunrise evoke feelings of calmness and peace, aligning with the emotional connection that luxury travellers seek in their holiday experiences. The golden tones of the sunrise, combined with the deep blues of the sea, create a sense of relaxation and exclusivity, suggesting that these islands are not just tourist destinations but sanctuaries for escape and well-being. These visuals align with well-established clichés of idyllic island getaways, leveraging familiar tropes of untouched coastal beauty and tranquility.

Linguistically, Sicily and Sardinia are framed as premier tourist destinations, emphasising their amazing qualities. The phrase 'to enjoy and explore' suggests an immersive experience, positioning the islands not only as places for relaxation but also as destinations to be actively engaged with on a deeper level. The sentence 'turn your vacation in Sicily into a precious, long-lasting, cherished memory' personalises the message, making the addressee feel that their experience will be meaningful and special. Additionally, references to history, culture, and good food appeal to the luxury traveller's desire for enriching experiences that extend beyond relaxation, reinforcing the aspirational nature of the destination.

Multimodal discourse in this section creates an emotional narrative that invites the addressee to imagine themselves experiencing these islands as places of beauty, serenity, and personal significance. By framing Sicily and Sardina as transformative destinations, the message reinforces the brand's aspirational appeal.

Figure 6. Homepage of Mangia's Official Website: Destinations Section



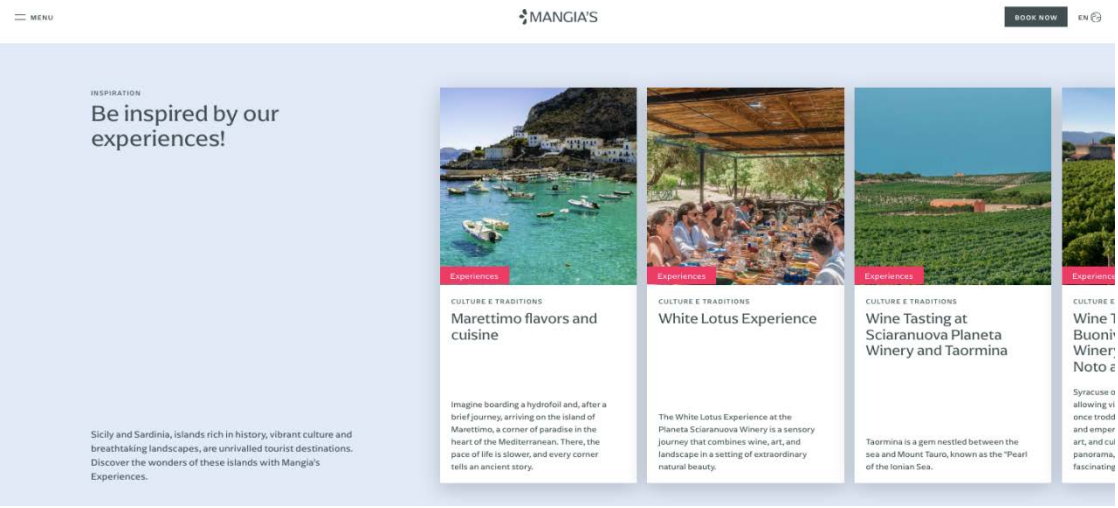
The final section of the website's homepage (Figure 7) presents luxury experiences-such as 'Marettimo Flavors and Cuisine', 'White Lotus Experience', and 'Wine Tasting at Sciaranuova Planeta Winery and Taormina'-using a minimalist design in shades of blue to evoke sophistication and elegance. These experiences are positioned as unrivalled, with the descriptive adjectives 'rich', 'vibrant', and 'breathtaking' reinforcing their allure. The use of key words such as 'history' and 'culture' appeals to affluent travellers seeking enriching experiences, while the phrase 'be inspired by our experiences' invites personal engagement.

In the 'Marettimo Flavors and Cuisine' subsection, the image of boats in Marettimo's pristine waters is paired with verbal metaphors like 'corner of paradise' and 'heart of the Mediterranean', enhancing the destination's authenticity and tranquil appeal. Visual and verbal techniques combine to create an immersive experience, encouraging the viewer to imagine embarking on a unique culinary journey.

The 'White Lotus Experience' subsection uses imagery of people dining together in a vineyard, evoking a serene and welcoming atmosphere. This visual representation underscores the conviviality and communal nature of Italian dining culture, where meals are not merely about food but about sharing moments of connection and togetherness. The phrases 'sensory journey' and 'extraordinary natural beauty' evoke a transformative, immersive luxury experience. The reference to the 'White Lotus' series adds prestige, reinforcing the offering's exclusivity. By integrating visual and verbal techniques, this section positions the experience as both immediate and enduring, presenting it as a cultural and sensory journey.

In the 'Wine Tasting at Sciaranuova Planeta Winery and Taormina' subsection, an image of a vineyard enhances the authenticity of the experience, helping the addressee envision it more vividly. The strategic use of metaphors such as 'gem' and 'pearl of the Ionian Sea' elevates the status of the destination. This combination of visual and verbal techniques enhances the luxury of the offering, positioning it as an authentic and unforgettable event.

Figure 7. Homepage of Mangia's Official Website: Experiences Section



In conclusion, Mangia's establishes its brand identity online by strategically integrating visual, verbal, and interactive elements to shape a narrative of desire, exclusivity, authenticity, and cultural richness. Through minimalist design, calming colours, and evocative imagery, the brand reinforces its luxurious identity and positioning. The verbal techniques engage the addressee emotionally, inviting them to personally connect with the brand and envision themselves as part of an exclusive experience.

By framing luxury tourism as a transformative journey that extends beyond relaxation to encompass deep cultural engagement and personal enrichment, Mangia's effectively redefines the luxury tourism experience. It positions its offerings not merely as high-end services but as unique, immersive experiences that appeal to affluent travellers' desires for authenticity, status, and memorable moments. The distinctiveness of Sicily and Sardinia further strengthens this narrative by presenting the two islands as destinations that promise both physical and emotional detachment from everyday life, heightening their appeal as aspirational and culturally immersive retreats. Through this multimodal approach, Mangia's successfully frames luxury tourism as an experience that blends relaxation with a personal connection to Italy's rich heritage-one deeply tied to the distinctive charm and seclusion of its main islands.

Research limitations. *This paper is a preliminary version of broader research examining Mangia's multimodal brand communication across its official website and social media. A key limitation is its ongoing nature, as only the website's homepage has been analysed so far. Future research will extend to social media platforms, where the dynamic and interactive nature of digital content may offer deeper insights into the multimodal construction of the brand's identity and the representation of luxury tourism across multiple channels.*

Managerial implications. *This study underscores the strategic relevance of multimodal rhetoric in luxury hospitality branding. Even in digital contexts, rhetorical devices such as emotional appeals, selective omission, and symbolic imagery remain powerful tools for crafting persuasive narratives. The case of Mangia's illustrates how brands can humanise their identity, reinforce exclusivity, and convey authenticity through carefully orchestrated multimodal discourse. Managers should take note of how seemingly traditional techniques-when adapted to contemporary digital formats-can still resonate with today's experiential consumers.*

By adopting a systematic rhetorical lens, this study provides hospitality professionals with a structured model for assessing their own brand messaging. Future managerial efforts should focus on refining the interplay between linguistic and visual storytelling, particularly in cross-platform strategies that span from official websites to social media content.

Originality of the paper. *This study advances research on multimodal brand communication in luxury tourism by examining how visual and verbal elements interact in the digital landscape. Unlike previous studies that focus primarily on quantitative brand perception or linguistic analysis, this research applies Dann's (1996) rhetorical framework to explore how visuals and language combine to construct brand identity and shape the framing of luxury tourism online. By analysing a luxury hospitality brand, the study demonstrates how multimodal strategies reinforce exclusivity, authenticity, and experiential value in digital branding. As digital communication continues to evolve, this study provides a foundation for future research on how luxury tourism brands leverage multimodal storytelling to engage high-net-worth travellers in an increasingly digitalised marketplace.*

Key words: *strategic communication; digital branding; tourism discourse; multimodality; luxury tourism*

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Websites

http://www.mangias.com/en

Track 11
Strategy & Governance

Strategic management in the public sector: new leadership models to navigate the turbulent post-Covid era

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Abstract

Although across all sectors and business processes there are paradigm shifts, due to the technological-digital invasion and socio-economic upheavals that radically change the way people are motivated and sustainable strategies are implemented, the ability of any organization to survive still rely on its leaders' ability to adapt to these changes and make decisions. Public sector is not excluded from these changes: then the aim of this study is to shed light on leadership in the context of the public sector. Specifically, the objective is to understand the challenges experienced by new leaders of the public sector in light of the upheavals of the actual unstable and complex digitalized post-covid era. Then, since leaders plays a key role to manage these difficulties (and although the attention on leadership evolvement has grown), scholars' effort mainly focused on examining these dynamics into the private sector. Evidence of this is a recent leadership model proposed in the literature (named STP leadership) that has been developed only considering private organizations. In contrast this work, aims to understand whether such recent leadership conceptualization can also be implemented in public administration contexts. To do so, it delves into viewpoints of employees working in the public sector and the analysis of guidelines researched within the public sector together, providing a more comprehensive understanding, enriching the knowledge about leadership and public sector strategic management by analysing new directions taken to deal with the actual constraints and turbulence of the market.

Framing of the research. *The concept of leadership has deep roots in ancient times and has evolved over time. Particularly in the work and business context, in recent decades, leadership styles have evolved from traditional, authoritarian, and task-focused approaches to more participatory models. These newer models place greater emphasis on people and aim to create more comfortable work environments, in response to significant organizational and social changes (Stone & Patterson, 2023). In order to provide a solid theoretical framework, in according with recent published studies on the topic (Palmucci & Ferraris, 2025) actual leadership theorizations can be categorized as follow:*

- *Theories that focus on the leader/follower relationship: Transformational and transactional leadership are two key styles focused on the leader-follower relationship. Transformational leadership involves inspiring and motivating team members to exceed expectations, emphasizing personal and organizational growth through deep relationships and emotional engagement (Khalili, 2016). These leaders create a compelling vision, foster critical thinking, and support individual development, promoting innovation and long-term change (Humphreys & Einstein, 2003). In contrast, transactional leadership focuses on structure, organization, and performance, using a system of rewards and punishments to ensure adherence to clear roles and processes (Afshari & Gibson, 2016). It prioritizes stability, efficiency, and measurable short-term results but may limit creativity and adaptability, making it more suitable for routine or highly structured environments (Febrian et al., 2023).*
- *Theories focused on particular characteristics of the leader: Some leadership theories focus on specific leader characteristics and define leadership styles based on these traits. Authentic leadership, for example, emphasizes integrity, transparency, and genuine alignment with one's values, fostering trust and respect through clear and open communication (Avolio & Gardner, 2005). Servant leadership instead (more a 'management philosophy' than a style), prioritizes serving others, focusing on the needs of the team, organization, or community over personal ambition (Parris & Peachey, 2013). Servant leaders show a strong inclination to support others, promoting followers' development and well-being, in contrast to traditional leadership models that emphasized authority, power, and control. Lastly here, inclusive leadership promotes integration, respect, and appreciation of diversity within a team or organization (Tran & Carey, 2017). It is based on the idea that everyone, regardless of background, identity, or perspective, can significantly contribute to collective success. This approach aims to create an*

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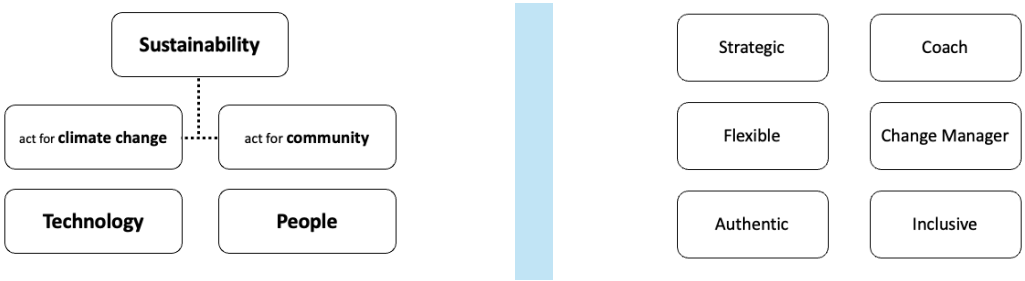
environment where individuals feel welcomed, respected, and encouraged to participate fully according to their unique qualities (Korkmaz et al., 2022).

- *Theories that broaden the horizon to different situations/contexts= Some leadership theories extend beyond the workplace into broader contexts, highlighting the importance of adaptability, well-being, and a holistic approach to leadership success. This is the case of Situational leadership, a management model that emphasizes adapting leadership style to specific circumstances and the needs of the team, moving away from predefined behavior patterns (Thompson & Vecchio, 2009). It suggests that effective leaders adjust their behavior based on the maturity and development of followers and the specifics of the context. This approach values flexibility and personalized treatment to enhance trust and competence within the team (Ahern & Loh, 2021). Another relevant model is the total leadership one, a theorization that goes beyond professional life, focusing on work, family, and community (Friedman, 2014). In particular it aims to help leaders create synergy between different life aspects, make conscious decisions, and achieve a balanced and meaningful life. The model emphasizes strategies for managing time, balancing commitments, and setting clear boundaries between roles.*
- *Theories that emphasize innovation and digitalization= Innovative and digital leadership are two modern theories with a forward-looking approach. Both styles emphasize adaptability, collaboration, and maintaining a balance between technological advancements and human-centric leadership, contributing to sustainable and beneficial growth for organizations (Palmucci & Ferraris, 2025). More in particular, innovative leadership aims to inspire change and promote creative ideas within teams, focusing on anticipating change, taking unconventional approaches, and transforming opportunities into strategic advantages (Şen & Eren, 2012). Key traits include openness to change, a future-oriented vision, fostering creativity, empathy, active listening, and agile decision-making. Digital leadership instead, focuses on managing change in technology-driven contexts (Gledson et al., 2024). It involves leveraging digital tools, promoting innovation, and guiding teams through digital transformations. Digital leaders need strong technological competence, adaptability, and effective management of distributed teams. While technology-focused, they also prioritize people, enhancing digital skills and creating inclusive environments (Turyadi et al., 2023).*

The theories described represent the body of research on leadership and also the baseline for actual leadership development programs present in the organizations. That said, as scholars' effort and journey to understand leaders' new challenges, skills and is still ongoing (Fullan et al., 2024). On this direction, a recent published work found that actual leaders' areas of intervention in this complex post-COVID era are Sustainability (referred to act for climate change and act for the community), Technology and People - from here the definition STP leader- (Palmucci et al., 2025). Figure 1 below shows these areas of intervention and the six relevant skills needed to manage these three challenges. In other words the new leader must be: Strategic, Flexible, Authentic, Coach, Change Manager, Inclusive. In summary, the authors, in order to fully understand the dynamics of what they define as the new leadership, emphasize the need to consider the reference context in which leaders operate and to analyze the challenges of the present. Through a study involving companies of various sizes, they found that, to lead organizations in today's complex reality, the new leader must primarily focus on three areas: sustainability (acting to mitigate climate change and serve the community), technology (promoting digital transition and encouraging the use of innovative technologies), and people (focusing on what is necessary to motivate an increasingly diverse workforce compared to the past). Furthermore, the model does not only list the challenges faced by new leaders but also the specific skills required to successfully tackle these challenges, which represent the essential toolkit for managing modern organizations. As shown in Figure 2 below, the model graphically summarizes with arrows the skills needed for each area of intervention (e.g. Flexibility is required for all challenges, while Coach skills are needed only for the area of intervention of "People").

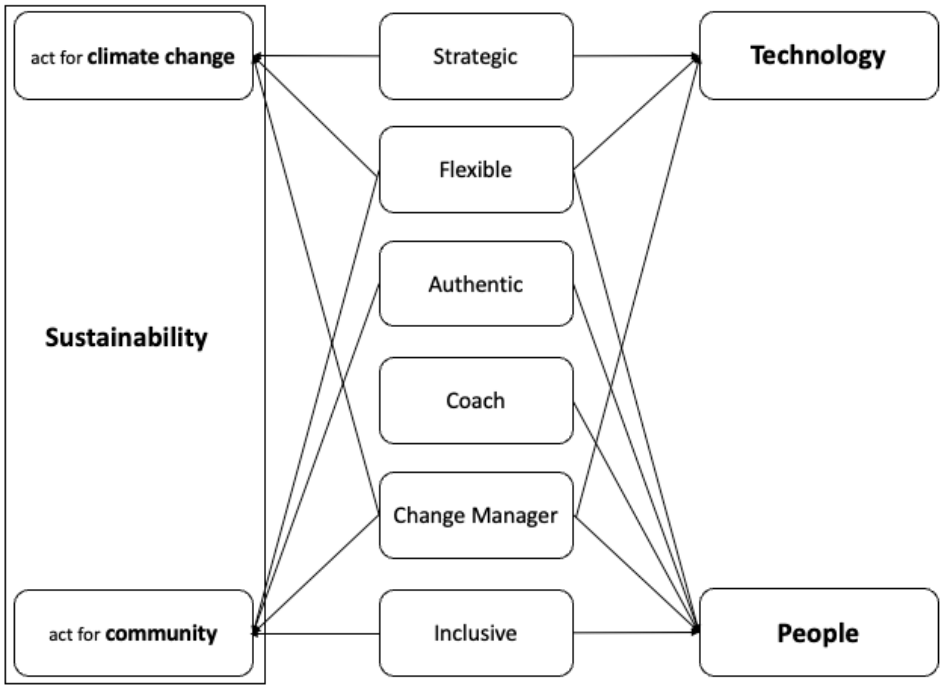
That specified, moving to the gap that this work aim to address, actual innovative models of leadership (including STP one) scarcely refer to the context of the public employment. It is to say that, although organizations are facing new constraints because of the digital transition and the need to manage renovate people needs and new sustainable requirements (Palmucci et al., 2025)- and despite these transitions have impacted organizations of all sectors and the public one is not excluded - evidences on the applicability of modern conceptualizations of leadership to have a more comprehensive understanding of leadership in the public context are still missing.

Fig. 1: STP leadership model: areas of intervention and skills needed to the new leaders



***Source**: Palmucci, D.N., Giovando, G., Vincurova, Z. (2025). The post-covid era: digital leadership, organizational performance and employee motivation. Management Decision.*

Fig. 2: STP leadership model: skills needed for each area of intervention



***Source**: Palmucci, D.N., Giovando, G., Vincurova, Z. (2025). The post-covid era: digital leadership, organizational performance and employee motivation. Management Decision.*

Purpose of the paper. *This research aims to shed light on leadership into the public organizational contexts, in particular on the challenges faced by leaders of the public sector, as well as the attitudes required to face the paradigmatic changes of this complex post Covid era. Therefore, this work aims to thoroughly understand leadership in the public sector by gathering perspectives from various civil servants working in different public institutions at different level. More concretely it seeks to determine whether the recent STP leadership model proposed in the literature can be implemented and considered valid in the public sector as well. The final output is to present concrete managerial implications and suggestions that top management in the public sector can utilize to equip their own context with effective leadership, thereby fostering a comprehensive understanding of the topic. In summary, we specifically evaluate the possibility to implement the STP model on the public sector.*

Methodology. *This study combines the analysis of some recent actual directives and guidelines promoted by the Italian Ministry of Public Administration with a qualitative methodology based on 15 interviews with civil servants working in different public institutions in Italy. In order to understand the current direction of leadership within the public sector, these resources have been thoroughly analysed to determine whether they contain references to (and emphasize the importance of) the core principles of the STP leadership model: sustainability, technology, and people. The documents of particular relevance that have been considered are:*

An important published article named "People at the Center: a Public-Private Dialogue on Strategic People Management": this document (that followed the conference of January 16, 2025 chaired by the Minister of Public Administration and from which this article emerged) outlines the objective of the public administration to initiate a strategic discussion and a structured and innovative dialogue between professionals and organizations in the public and private sectors on the topic of human resources management. This document describes how public organizations are responsible for representing the most virtuous and responsible behaviors in the eyes of citizens, employees, public and private stakeholders and public opinion in general and how, in order to address the most crucial challenges posed by contemporary complexity;

A new Directive from the Ministry of Public Administration on training and development of human capital: which is a guideline act that indicates the objectives, cross-cutting training areas and tools to support the training of public personnel;

The training catalogue of the National School of Administration (SNA): which is the institution responsible for selecting, recruiting and training managers and officials of the Italian Public Administration. In particular, we analyzed the training course offered on the topic of leadership;

With regard to the qualitative study instead, the decision to collect qualitative data through interviews was primarily informed by previous research demonstrating that interviews are an effective method for evaluating managerial aspects in the public sector (Mergel, 2021). Regarding the sample, a heterogeneous selection of participants from different branches of the public sector was adopted. This choice aligns with the exploratory nature of the study, ensuring a broader understanding of the phenomenon and enhancing the generalizability of the findings (Palmucci, 2023). Specifically, data were gathered from public employees at different hierarchical levels, in line with prior studies that have remarked the possibility to understand these dynamics through interviews (Van Wart, 2016). Furthermore, collecting data from workers across different branches of the public sectors and organizational settings aimed to enhance the study's exploratory impact of the study (Gustafsson, 2017). Therefore, participants were initially contacted to gauge their willingness to participate in the study and were provided with a general overview of its purpose. In the first part of the interview, demographic data (e.g., age, seniority level) and contextual information regarding their job position were collected. Subsequently, individual virtual interviews were conducted, each lasting an average of 30 minutes. Prior to data collection, participants were assured of the anonymity and confidentiality of their responses. The interview protocol included semi-structured questions, allowing participants to share their experiences after they were shown the STP model (Figure 2) and encouraged to discuss if it can be appropriate in the context of the public sector. Additionally, participants provided concrete examples of issues they faced, strategies they employed to navigate the actual complex reality, and both the communication difficulties and advantages they experienced. In cases where participants seemed to be very proactive, they were also invited to propose improvements to the model adoption in the public sector. The interviews concluded with a general discussion on participants' perceptions of growing concerns related to leadership and public sector difficulties. After 15 interviews, we noticed data saturation (Aldiabat & Le Navenec, 2018) and we stopped interviewing subjects. Following data collection, the research team transcribed the qualitative responses, assigned preliminary codes, identified recurring themes, examined variations, and ensured the reliability and validity of findings in line with established qualitative research methodologies as in Gioia et al., 2013.

Results. *As seen in the previous part, this study is focused on the analysis of documentations, guidelines and directives combined with interviews to employees working in different Italian public institutions. Therefore, the results are summarized as follow:*

<u>STP model can be applied to the public sector</u>= Thanks to the data analysis we can confirm that the new theorization of leadership proposed in the literature and that summarizes the 3 areas of intervention for the nowadays leader in a) sustainability; b) technology c) people. In particular with regard to the interviews, all participants indicated that these 3 areas are the same one with which today leader need to struggle to manage the complex reality. When asked participants to indicate additional, none reported another important area not considered from the model. On this direction one interviewee said: "these are exactly the areas that guide not only leaders but all operations at work. In addition, I think that is the combination of these 3 factors that should be pursued in each operation and at all levels. Not only, if I think about the sustainability part, I can say that probably this is more valid in the public sector than in the private as to act for the community is the core value of civil servants". Not only from interviews but also from the analysis of the documentations and guidelines it is possible to appreciate the effort to move the Italian public sector in the direction of this new actual challenges. Thanks to its strategic approach the Ministry of Public Administration is trying to lead an epochal change, making the administrative machine more modern, efficient, citizen-oriented and transforming the Public Administration into a model of excellence through cutting-edge ways of working that foster sustainability, digitalization and attention to human capital, adopting innovative policies that combine efficiency, processes simplification, environmental responsibility and new flexible and advanced technological and digital working methods. The article named "People at the Center: a Public-Private Dialogue on Strategic People Management" for example describes how public organizations are responsible for representing the most virtuous behaviors in the eyes of citizens, employees, public and private stakeholders and public opinion in general and how, in order to address the most crucial challenges posed by contemporary complexity, it is up to the leadership of public organizations to initiate the necessary change processes while keeping the course on 3 pillars: sustainability, technology and people. Specifically, public organizations with an innovative approach aim to achieve superior performance and create new forms of competitive advantage using the integration of 3 ESG parameters/criteria of sustainability: environment (environmental sustainability), social (social responsibility) and governance (good administration).

The first pillar, sustainability, is the core value of the mission and administrative action implemented by public organizations and is the expression of a change aimed at creating public value and pursuing sustainable objectives in terms of use of resources and environmental impact. According to the document analyzed, to lead the ongoing change is an essential need to develop a culture of sustainability in which operational efficiency is accompanied by a solid ethical vision that respects natural and social resources. In other words, the public sector entrusts the leadership role to individuals capable of making fundamental strategic and operational choices: a prepared top management that acts for the creation of public value and the development of the community in a sustainable way. In this direction, a director interviewed stated: "employees should never forget that they are providing a service to the community, this is why that sense of social utility value must be encouraged and promoted with determination".

The second pillar, technology, is the foundation of the digital transition in public employment, a revolution that sees the development of technologies at the service of people and the community. Innovations - including artificial intelligence and automation - are fundamental tools to enhance the effectiveness of public administrations. The advent of digital

technologies has already greatly enhanced and simplified many bureaucratic and administrative activities, effectively supporting human work. The focus should be on creating an harmonious combination of human and artificial working and creative capacity, improving efficiency and increasing productivity without losing sight of the humanization of work. As with all aspects of digital transformation, the successful implementation of digital technologies in public employment will rely less on technological capacity itself and more on human adaptability. Therefore, public leadership must focus on fostering technology adoption in ways that seamlessly integrate machine potential with human capabilities. The third pillar, people, serves as the foundation of public organizations, which operate both with and for individuals. In this context, the concept of "sustainability of people" has become central, emphasizing a holistic approach to human capital management. This approach integrates key elements such as diversity and inclusion, employee well-being and safety, fair compensation, talent recognition, soft skills development, and continuous workforce reskilling and upskilling. It is to say that, in the evolving model of public employment, people should not be just participants but the driving force behind organizational success. It is crucial to implement strategies that not only meet present demands but also anticipate future challenges. This forward-thinking perspective fosters inclusive and intelligent personnel management, ensuring that every individual is valued. Leadership plays a pivotal role in this transformation by cultivating trust, actively listening to employees' needs, and implementing innovative, forward-looking solutions. A reference to the STP system is also present in the new Directive on training and development of human capital, which is a guideline act that indicates the objectives, cross-cutting training areas and tools to support the training of public personnel. In the current economic and social context, characterized by rapid technological advances, continuous changes in the expectations of citizens and users of services, and global challenges, staff training is essential to allow public administrations to achieve adequate performance that, in terms of quantity and quality, can satisfy the demands and needs expressed by the community. Staff training is, first and foremost, a catalyst for productivity and organizational efficiency: people who receive training in the areas of ecological, technological transition and people development are better prepared to make decisions that contribute to the creation of public value, to reducing inequalities and to strengthening social equity and inclusiveness in the provision of services. Training programs cover, among other topics, skills for the implementation of the ecological transition (sustainability), the digital transition (technological advancement) and people development in line with the European Commission Communication on strengthening the European administrative space (ComPAct). The interdependent nature of the three transitions is quite evident and administrations are called upon to activate and adopt change processes that concern or combine the digital, ecological and personal dimensions and that require the activation of leadership skills, soft skills, as well as the adoption of principles and values common to public work. To do this, the National School of Administration (SNA) is offering 7 specific courses on the topic of leadership and ad hoc professional training reserved to public managers during 2025. To conclude, the STP model seems to fit doubtless the case of the public work and on this direction, one of the civil servants interviewed said: "STP model is extremely valid within our context that I think it is very important for leaders to get know this model and understand how it works; they must be aware of these three areas and find the right balance among them to keep the public sector system running. I would make it mandatory within the leadership courses".

<u>The most relevant area of intervention is "People" and the most relevant skills is "Flexibility"</u>= As seen just above from the analysis of documentations and directives, the focus on People is doubtless the key for public organizations and this is aligned with what found in the qualitative study. In fact all interviewees convene that the most important area of intervention is People. In particular a participant reported: "If I had to weigh the significance of the three areas, I would say 50% goes to People, while Technology and Sustainability each account for 25%". Another participant also stated: "focus on people is more important than ever, in fact if before it was traditionally seen as a stable and economically favourable career choice, the post-COVID socio-economic changes have challenged this perception. It is the case of new generations of workers who are less attracted to lifelong jobs, preferring diverse experiences (and increased mobility within the EU and technological advancements make better opportunities more accessible). Also, it is the case of slow wage adjustments in response to inflation that make public sector jobs often less competitive, with many positions remaining unfilled or new hires often leaving within months as it is happening to us". Regarding skills, most interviewees agree that flexibility is the key competence. As one participant put it: "Without flexibility, you cannot lead a public institution. It means being open to discussion, accepting feedback and criticism, and continuously improving". Another interviewee also stated: "Flexibility is the core skill, as it allows leaders to adapt to new technologies and procedures while also understanding and supporting their team".

Research limitations. *This study has certain limitations. Firstly, the constraints relate to the chosen approach. To avoid further fragmentation of managerial knowledge and enhance the validity of the findings, it is crucial to collect additional data, potentially incorporating diverse data collection methods (e.g., quantitative analysis). Moreover, further data collection also outside the solely Italian context will contribute to a deeper understanding of the phenomenon from both theoretical and managerial perspective and will help in defining control variables to keep under control. Additionally regarding the skills "Strategic", from the interviews emerged that organizations need "Strategies of people management", and this calls in for further studies to first evaluate if this can be considered for area of intervention "People" (and not only act for climate change (S) and technology (T), and also reveals as in this work the analysis of the skills has been given little relevance comparing to areas of intervention. Curiously for participant, "training" seems to be more important than recruitment in public contexts as few interviewees reported that, since people are not directly*

selected from the manager but are simply assigned to them after a public competition, then according to participants the only way for supervisors to guarantee performance is to understand the people in their team and, as a sport coach does, find the best way to "make each player perform". This aspect, although can be understandable, should be validated by considering in future studies a sample which includes additional job positions and levels.

Managerial implications. *As for managerial implications, the results of this study may be a useful strategic tool for the Italian public sector top management and professionals. It is to say that, if it is true that the STP leadership model is valid also within the context of the public sector, then its principle can be surely divulgated in form of training programme within leadership path designed for directors and top managers (or within some training catalogue of the National School of Administration - SNA). An additional managerial implication regards the possibility to empower managers by teaching them some coaching skills (in line with one of the skills indicated in the STP leadership model). This seems to be particular relevant as, unlike in the private sector, where hiring managers can directly choose their own resource, in the public sector instead resources "arrive" in managers' team because they won a public competition process, so for leaders it is extremely important to understand the players they have and try to get the best out of them. With regard to the sustainability area (S), and in particular the "act for community" dimension, policies should be updated to include the respect of few values as baseline of any contract. In other words, in order to guarantee value, employees of the public sector should constantly keep in mind that they are providing a service to the community and thus this sense of "social utility" must be constantly encouraged and promoted with determination in policies and communication campaigns.*

Originality of the paper. *This piece of work is relevant for top managers for directors and top leaders in the public sector, for managers to get aligned on actual challenges in their daily work, but also for the scientific community aiming to enhance their understanding of the matter of leadership. This because if studies on leadership in the private sector are relevant and continuously updated, in the public context the relevance of leadership in shaping efficient strategies is often not directly considered. In addition, previous research focused often on interviews only, only one organizational context or consideration on policies and directives, whereas this study combines qualitative study with documents and directives analysis and explores diverse viewpoints from civil servants working at different level, offering a more holistic understanding on the topic of leadership and in particular trying to implement an already recognized new model (STP) generated in the private sector to the cause of the public one. In addition, the diverse sample of participants interviewed represents different work environments across different sectors (increasing the generalizability of the findings) in diverse domains as also done in previous studies (Bresciani et al., 2016).*

Key words: *leadership; public sector; strategic management;*

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Do Financial Indicators Affect Employee Resilience? Examining the Mediating Role of Employee Motivation

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Employee resilience has gained increasing attention as a critical factor in organizational success; yet limited research has examined the role of financial indicators-such as total assets, turnover, and labor costs-in shaping resilience outcomes. This study investigates the influence of these financial indicators on employee resilience, with a particular focus on the mediating role of employee motivation. Drawing on the Conservation of Resources (COR) Theory, we hypothesize that financial stability (i.e., total assets, staff investment, and turnover rate) influences resilience both directly and indirectly through its impact on employee motivation; however, the effect varies depending on the specific financial indicator. Using a structural equation modeling approach, we analyze data from a sample of 1,463 Italian employees to assess these relationships. Our findings suggest that financial stability (i.e., high total assets and staff investment) enhances employee motivation, which in turn strengthens resilience. However, high turnover rates weaken motivation, thereby reducing resilience, highlighting the importance of employee retention strategies. This study provides both theoretical and practical implications for organizations seeking to cultivate a resilient workforce in response to financial conditions.

Keywords: *Financial stability, Resilience, Motivation, COR*

Introduction

Employee resilience has emerged as a critical factor in contemporary organizations, influencing both individual and organizational performance in dynamic and uncertain work environments (Bardoel et al., 2014; Long et al., 2025). Resilience enables employees to cope with job-related stress, maintain performance under pressure, and adapt to change (Youssef & Luthans, 2007; Nguyen et al., 2024). In today's competitive business landscape, where economic fluctuations and workplace demands are constantly evolving, fostering employee resilience is essential for sustaining productivity and organizational stability (Cooper et al., 2019). Despite its recognized importance, limited research has examined the financial determinants of employee resilience, particularly how organizational financial indicators influence motivation, which in turn enhances resilience (Luthans et al., 2020).

Resilience plays a crucial role in workplace sustainability by enabling employees to effectively manage high workloads, collaborate with others, and use workplace challenges as opportunities for growth (Robertson et al., 2015). Organizations benefit from a resilient workforce through reduced absenteeism, higher engagement, and improved adaptability to economic and structural shifts (Avey et al., 2011). While previous studies have focused on individual traits that contribute to resilience (King et al., 2016), there is a growing need to investigate external organizational factors, such as financial stability and resource allocation, that may shape resilience indirectly through employee motivation (Deci & Ryan, 2000). Although research on employee resilience has expanded in recent years, existing studies primarily emphasize psychological and behavioral aspects, overlooking the financial underpinnings that influence resilience development (Luthans et al., 2020; Cooper et al., 2019). While financial indicators such as the operating ratio, long-term debt ratio, and long-term debt per capital (Prysmakova et al., 2019; Lau & Roopnarain, 2014) have been linked to employee motivation, other indicators, such as total assets, turnover rate, and labor costs, have not yet been explored, and their impact on employee motivation and resilience remains underexamined. This study seeks to bridge this gap by examining how financial indicators shape employee motivation and, in turn, resilience. Specifically, our research investigates the mediating role of employee motivation in the relationship between financial indicators and resilience, thereby addressing a crucial missing link in organizational resilience literature.

Based on an analysis of information from a sample 1463 Italian employees, this study aims to contribute to the understanding of the mechanisms through which financial indicators influence employee resilience. We hypothesize that financial indicators directly impact employee motivation, which subsequently enhances resilience. Furthermore, we

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propose that motivation serves as a mediating factor between financial indicators and employee resilience. By empirically testing these relationships, we seek to provide a nuanced understanding of how financial stability, resource investment, and compensation structures contribute to workforce resilience. Adopting the theoretical lenses of COR theory we argue, resource availability and financial stability (i.e., total assets and turnover rate) play a significant role in shaping employee motivation, which in turn enhances resilience. This research underscores the importance of financial resource allocation in fostering a resilient workforce, offering theoretical and managerial insights into resilience-building strategies. By highlighting the mediating role of motivation, our study provides a fresh perspective on the indirect influence of financial conditions on employee resilience. These insights have practical implications for human resource managers, organizational leaders, and policymakers seeking to enhance employee resilience through financial and motivational strategies.

Financial Indicators and Employee Motivation

There are several reasons that explain the relationship between financial indicators and employee motivation. First, consistent with the Conservation of Resources (COR) Theory (Hobfoll, 1989), employees strive to preserve valuable resources, and uncertainty about financial conditions leads to stress and demotivation. Higher financial stability (i.e., total assets and turnover rate) enhances employees' sense of job security and psychological safety, ultimately leading to higher motivation. As noted by Prysmakova et al. (2019), financial stability positively correlates with employee motivation and retention. Likewise, Jiang et al. (2012) demonstrated that organizations with higher financial performance tend to have lower turnover rates and higher employee engagement. Second, organizations with strong financial performance can invest in employee growth and workplace improvements, thereby fostering long-term intrinsic motivation. Companies with higher total assets and labor cost investments have the ability to allocate more resources to training, skill development, and career growth opportunities. In turn, skill mastery serves as a key driver of intrinsic motivation (Gagné & Deci, 2005). As noted by Noe et al. (2017), financial investment in employee training significantly boosts intrinsic motivation. Similarly, Taris & Schaufeli (2015) found that organizations with higher labor costs allocate more resources to personal and professional growth, further enhancing intrinsic motivation. Third, financial indicators such as low turnover rates signal a stable and supportive work environment, strengthening employees' sense of belonging and purpose-two critical factors in intrinsic motivation. As noted by Dysvik & Kuvaas (2010), employees working in companies with low turnover rates experience stronger intrinsic motivation, primarily due to increased social support and a stronger organizational culture. Building on these arguments, we hypothesize that:

H1: Financial indicators (i.e. total asset, turnover rate and labor costs) positively affect employee motivation.

Employee Motivation and Employee Resilience

Consistent with the COR theory (Hobfoll, 1989), motivated employees accumulate psychological resources (e.g., self-efficacy, optimism) that enhance their ability to withstand adversity. In this view intrinsically motivated employees experience higher resilience because they are more likely to engage in adaptive coping strategies when faced with workplace stressors. As noted by Luthans et al. (2007), intrinsic motivation is positively associated with psychological capital, which includes resilience (as well as optimism, and self-efficacy). In another example, Ryan & Deci (2020) demonstrated that employees with high intrinsic motivation are more likely to use problem-focused coping strategies, which help them manage high workloads effectively. Moreover, intrinsically motivated employees who find joy and personal meaning in their work are more likely to build strong interpersonal relationships, which are essential for workplace resilience. As noted by Dutton et al. (2014) employees with high intrinsic motivation actively build social resources, which improves their resilience in handling workplace stressors. Lastly, employees with intrinsic motivation view workplace change as a learning opportunity rather than a disruption, making them more adaptable and resilient to organizational transformations. As noted by Frazier et al. (2013), individuals with high intrinsic motivation show greater psychological flexibility, which improves resilience in the face of uncertainty. Likewise, Seidel et al. (2024) demonstrated that intrinsically motivated individuals are more likely to embrace change, rather than resist it. Building on these arguments, we hypothesize that:

H2: Employee motivation positively affects employee resilience.

Financial indicators, employee motivation and employee resilience

Consistent with previous discussion strong financial performance (e.g., high total assets, stable turnover rate, and adequate labor costs) allows organizations to create a motivating work environment (i.e. by offering better compensation, training, and growth opportunities). When employees feel valued and supported, they develop intrinsic motivation (Gagné & Deci, 2005), leading to greater resilience in handling work challenges (Seidel et al. 2024). In this view, intrinsic motivation acts as a psychological buffer against work stress as motivated employees perceive high workloads and workplace challenges as opportunities for growth rather than as threats, increasing their ability to sustain resilience. Relatedly, intrinsic motivation enhances adaptability and collaboration, strengthening resilience (Frazier et al., 2013). Building on these arguments, we hypothesize that:

H3: Employee motivation mediates financial indicators and employee resilience.

Methods

Data collection and sample

To test the hypotheses formulated above, we built a database that combined two sources of information. First, we conducted a survey to collect data from five major monobrand retailers in various sectors in Italy. In total, over 3000 questionnaires were sent to sales assistant and store managers, of these, 1752 workers completed the questionnaires. Due to excessive missing values, 289 observations were dropped, resulting in a final sample of 1463 participants and a 58.4% response rate. Most participants were female (83.25%), and were 26-35 years old (36.71%). Second, for financial data, we exploit the financial statements available in the AIDA (Analisi Informatizzata Delle Aziende) database by Bureau Van Dijk, which is the Italian subset of the Orbis/Amadeus database, collecting information on "all Italian companies" that are required to file their accounts. The AIDA database accounts for more than 6.49 million companies and cooperatives as of March 2025 and has been widely used in other Italian studies.

Measures

We used measures validated in prior research. Financial indicators (i.e., total assets, labor cost, and turnover rate) were measured using the average of total assets, labor cost per employee, and turnover per employee, adjusted for firm size, based on data from the AIDA dataset for the study period (2015–2022). For employee motivation, we relied on three items adapted from Gagné et al. (2010), validated in previous studies. Respondents answered the items using a five-point scale (1 = never to 5 = always). A sample item is: "I enjoy this work very much." The Cronbach's alpha for this scale was 0.823. For employee resilience, we used three items developed by Näswall et al. (2019), namely "I successfully manage a high workload for long periods of time.", "I effectively collb -orate with others to handle challenges at work.", and "I use change at work as an opportunity for growth." Cronbach's alpha for this scale was 0.825. Control variables included in the analyses are gender (1 = male, 0 = female), age (1 = 18-25, 2 = 26-35, 3 =36-45, 4=46-55. 5=56-65 and 6 = ≥ 65), worker role (1 = sale assistant, 0 = store manager), and employment contract (1 = permanent contract, 0 = temporary).

Analytical procedure

This study employs Structural Equation Modeling (SEM) and excludes observations with over 10% missing data to prevent bias. To identify possible outliers and control the risk of multicollinearity, we calculated Mahalanobis distances, and the variance inflation factors (VIFs) respectively. The results ruled out the possibility for outliers and the VIFs, including for all interactions, amounted less than 2, which were far from the threshold of 10, suggesting there is no issue of multicollinearity (Menard, 1995).

To assess the extent to which the five variables were distinct, a Confirmatory Factor Analysis (CFA) was conducted. The assumptions about a good model fit analyzing absolute, relative, and parsimonious indices as well as constructs' reliability and validity were checked. Subsequently, to test the hypotheses, we conducted a path analysis to estimate coefficients. In addition to the check of direct effects, we used the bootstrapping technique to estimate indirect effects. Data were bootstrapped with 5000 sample replications and 95% confidence intervals. Also, the representation of the significant moderation effect between the standardized variables (Aiken et al., 1991) was provided. Finally, the mediation effect was evaluated.

Results

Hypothesis testing

Means, standard deviations, and correlations among the variables are reported in Table 1.

Table 1: Descriptive statistics and correlations

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1	Employee resilience	.017	.727												
2	Employee motivation	.036	.716	.44											
3	Total assets	8.50	195.87	-.02	-.00										
4	Turnover	1.08	.324	-.05	-.08	.93									
5	Labor costs	9.85	.401	.07	.09	-.72	-.86								
6	Age	2.62	1.049	.07	.09	-.10	-.19	.01							
7	Work role [a]	.648	.478	-.16	-.20	.05	.12	-.05	-.23						
8	Gender [b]	.833	.374	.01	.12	.13	.04	.11	-.02	.16					
9	Permanent contract	.751	.433	.02	-.01	-.22	-.19	.14	.30	-.23	-.02				
10	Employee flexibility	.012	.558	.55	.34	-.02	-.03	.07	-.05	-.16	.04	.02			
11	Perceived organization support	.027	.863	.32	.63	-.02	-.09	.07	.07	-.09	.09	-.01	.22		
12	Organizational training	-.041	105.63	.19	.42	-.09	-.12	.00	.13	-.13	.00	.03	.12	.66	
13	Job satisfaction	.036	.829	.35	.76	.00	-.07	.08	.10	-.25	.09	.01	.26	.64	.41

Note: Coefficients greater than .06 are significant at $p < .01$ (two-tailed); Number of observations = 1463.
a. The reference group is store manager.
b. The reference group is female.

Direct effects of the control variables are reported in Table 2.

Table 2: Direct effects of the control variables

	Motivation	Resilience
Age	.02 (.01)**	.04*** (.01)
Work role (sales assistant)	-.05 (.02)**	.01 (.03)
Gender (female)	.06 (.03)**	-.04 (.04)
Permanent contract	-.06 (.02)**	.003 (.03)
Employee flexibility	.17 (.02)***	.59*** (.03)
Perceived organization support	16 (.02)***	.06 ** (.03)
Organizational training	.02 (.01)	-.01 (.02)
Job satisfaction	.48 (.02)***	.007 (.03)

Note: standard errors in parentheses. *$p < .10$, **$p < .05$, ***$p < .01$

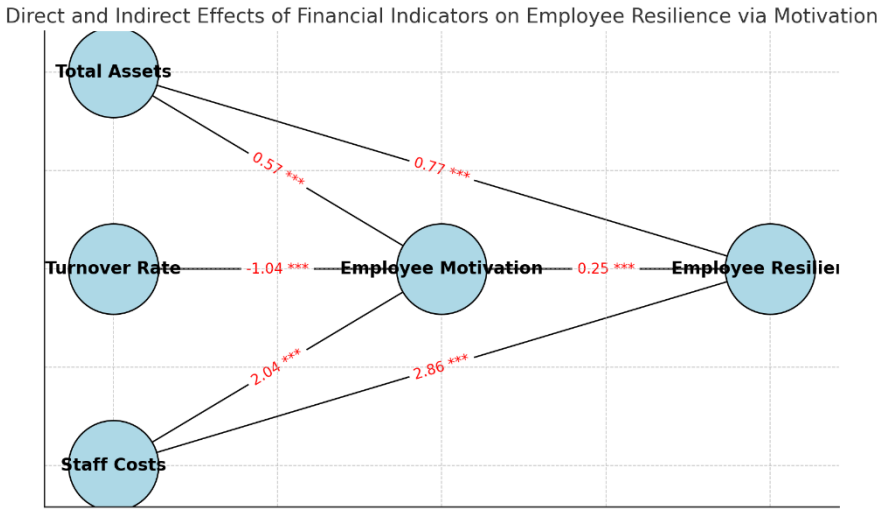
Bootstrapping analyses were used to test the mediation effects. Table 3 shows the estimates of the indirect effects and the bootstrap confidence intervals. Statistically significant relationships are represented by the intervals which do not include 0. Figure 1 reports that while total assets and staff investment (i.e. labor cost per employees) positively related to employee motivation (β =.57, $p < .001$) and (β =2.04, $p < .001$) respectively, employee turnover negatively relates to employee motivation (β =-1.04, $p < .001$), supporting partially Hypothesis 1. As for H2 our findings suggest that employee motivation is positively relate to employee resilience ((β =.25, $p < .001$), supporting Hypothesis 2. Results in Table 3 also reveal a positive significant indirect effect of financial indicators on employee resilience (estimate = .20, CI [.04, .23] for total asset; estimate =.50, CI [.16, .84] for labor costs and estimate = -.25, CI [-,43 -.08] for employee turnover). However, Hypothesis–3 is partially accepted since the direct effect of financial indicators on employee resilience is significant (see Figure 1).

Table 3: Indirect effects and moderated mediation

	estimate	95% CI
Indirect effects		
Total assets →Motivation →Resilience	.20	[.04, .23]
Labor costs → Motivation → Resilience	.50	[.16, .84]
Turnover→ Motivation → Resilience	-.25	[-.43, -.08]

Note: CI = confidence interval (bootstrap)

Figure 1:



Robustness test

To address the potential for common method bias (CMB), which can arise from collecting all measures from the same source at the same time, we implemented several strategies. First, we adhered to the guidelines proposed by Podsakoff et al. (2003) during the survey design. To create psychological separation, we included additional questions about workers' years of experience and employment time (e.g., full-time, part time: 10-20 hours or more than 20 hours per week), divided the survey into sections with detailed introductory instructions, and required respondents to refocus their attention before moving to the next section. Free-text boxes and varied rating scales were also incorporated to capture respondents'

opinions and reduce monotony before completing subsequent scales. We complemented these design measures with Harman's one-factor test (Harman, 1976) using exploratory principal components factor analysis. The analysis indicated that the variance explained by a single factor was below the commonly accepted threshold of 50%. Subsequently, following prior literature, we assessed CMB using the common latent factor (CLF) technique (Clarke & Higgs, 2020) to calculate the percentage of variance attributable to CMB. In this process, we introduced a CLF and constrained its factor loadings to be equal with all indicator variables. We then ran both models (with and without the CLF) for comparison. Our analysis indicated that the inclusion of the CLF did not significantly alter the parameter estimates, and the variance explained by the CLF was 0.10, well below the 0.2 threshold, suggesting no significant CMB.

Discussion

The present study sheds light on three aspects of financial indicators-total assets, labor costs and turnover rate-and their association with employee motivation as a mechanism facilitating employee resilience. It also contributes to the related literature in several ways.

First, our findings highlight the significant role of financial indicators in shaping both employee motivation and employee resilience, although the impact varies depending on the specific indicator considered. This result aligns with prior research suggesting that individuals' work-related attitudes and behaviors are influenced by financial stability and organizational resource availability (Prysmakova et al., 2019; Deci & Ryan, 2000). Our results confirm that financial stability measured through total assets and labor cost investment positively influences employee motivation. This finding supports the COR theory (Hobfoll, 1989), suggesting that employees seek to preserve and accumulate resources that provide a sense of security and career growth. When organizations allocate financial resources effectively (i.e. through competitive salaries, training investments, job security or better wellbeing) employees perceive greater value in their roles, which enhances intrinsic motivation (Gagné & Deci, 2005). However, we also found that high turnover rates negatively impact motivation, possibly due to heightened job insecurity and instability. Frequent employee departures may disrupt workplace cohesion, leading to uncertainty about career progression and reducing autonomy, competence, and relatedness-the core psychological needs essential for intrinsic motivation (Deci & Ryan, 2000). This underscores the importance of retention strategies and stable employment policies in sustaining motivation levels.

Second, and consistent with our expectations, we found employee motivation was positively linked to resilience, indicating that motivated employees are better equipped to handle stress, adapt to change, and maintain performance under challenging conditions (Youssef & Luthans, 2007). Employees who find their work engaging and aligned with their values are more likely to perceive challenges as opportunities rather than threats (Robertson et al., 2015). Furthermore, motivation fosters higher levels of psychological capital, which strengthens coping mechanisms and resilience in demanding work environments (Luthans et al., 2020). Third, our findings also confirm that employee motivation mediates the relationship between financial indicators and resilience, meaning that financial stability alone does not directly (but partially) enhance resilience; rather, it works by fostering a motivated workforce. This aligns with previous studies suggests that organizational resources (e.g., financial stability) promote motivation (Bakker & Mostert, 2024), which in turn strengthens employees' ability to manage stress and adversity. This mediation effect highlights a critical implication that simply improving financial performance does not automatically lead to a resilient workforce. Instead, organizations must ensure that financial investments are directed toward employee motivation (maybe by enhancing employee well-being, development, and job satisfaction).

While this study provides valuable insights, it has some limitations. First, the reliance on self-reported cross-sectional data may introduce biases such as CMB, and prevent a causal interpretation of the relationships. Future research could incorporate longitudinal data or objective performance measures to validate these findings. Additionally, cultural and industry differences may moderate these relationships, suggesting the need for cross-country comparisons to explore how financial indicators impact employee motivation and resilience in diverse economic settings.

Conclusion

Overall, this study highlights that financial indicators play a crucial role in shaping employee motivation, which in turn enhances resilience. However, the impact of financial stability varies depending on the specific indicator, while higher total assets and staff investment boost motivation, high turnover undermines it. These findings suggest that financial stability alone is not enough and organizations must strategically allocate resources to foster motivation and thereby their employee resilience.

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Market demand shocks, bottom-up approach to firm's risk analysis, and risk-return arbitrages

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Abstract

In recent decades, firms have increasingly faced shocks in demand caused by factors both endogenous and exogenous to the economic system. Indeed, in several industries, mainly in those characterized by strong interconnections with other industries and with the dynamics of macroeconomic variables, firms are increasingly subject to extraordinary positive and negative change in demand for their goods. In this vein, the risk-return profile of individual firms tends to alternate optimal conditions with suboptimal ones. The present paper aims to develop a theoretical framework focused on the opportunity to exploit positive and negative shocks in demand to take advantages in terms of risk-return arbitrages. To this end, our analysis emphasizes the role of unlevered risk (or operating risk) decomposition according to a managerial logic. This implies a risk-return modelling partially in contrast with traditional risk-return models coming from canonical financial theory.

Framing of the research. *We adopt a theoretical framework based on previous research that look at firm's risk analysis as a kind of puzzle where internal firm's features act as factors that amplify or mitigate the positive relationship between firm's risk and firm's expected profitability. Therefore, our theoretical framework is based on a bottom-up approach, i.e., on the main independent variables with respect to corporate performance volatility. Such independent variables are the firm's structural leverages and the volatility of the competitive environment.*

The application of traditional risk-return analysis requires adaptation processes concerning the internal features of the firm, its competitive environment and also its ability to apply risk transfer mechanisms that allow smooth corporate performance over time (Renzi, Taragoni, Vagnani, 2024; Vagnani, Renzi, Taragoni, 2025). In this vein, the present paper aims to deepen the following two topics: i) the bottom-up approach to measurement of unlevered specific risk (or unlevered idiosyncratic risk); ii) the conceptualization, in both quantitative and logical terms, of the exploitation of risk-return arbitrages based on management of the firm's real side, rather than its financial side. We define a bottom-up approach as a risk return analysis based on internal firm's fundamentals. It is in contrast with a top-down approach typically based on market model.

Finance and management studies have argued a close interlinking between firm's competitive environment and firm's risk-return profile: the drag effect of capital market returns on the return of an individual stock tend to be more intense in those industries characterized by high volatility. For instance, firms belonging to industries characterized by strong technological innovations, high cyclicality of demand and/or changes of price and cost per unit are, at an aggregate level, highly exposed to systemic risk. In this regard, financial analysts look at the volatility of a given industry as a proxy to reach volatility of those firms belonging to it. This kind of approximation is adopted especially in measuring unlevered risk of unlisted firms. Thus, according to this approach, each industry (or a sub part of it including comparable firms) is conceived as a sort of homogeneous cluster in terms of unlevered risk-return. From a practical point of view, the assumption according to which the firm performances volatility is strongly influenced by the industry where the firm works arises as the easiest manner to classify economic activities according to a risk-return perspective. However, this general logic, although widely adopted, appears limited in its scope as it does not allow to figure out the role played by specific firm's factors that affect the actual risk-return trade-off.

In fact, the general relationship between volatility at the industry and individual firm levels does not mean that idiosyncratic and systematic risk are completely exogenous to firm's strategies, its internal efficiency, kinds of investments, propensity in making innovation, organization capabilities, etc. Therefore, managerial actions may produce very different outcomes between the average industry's performance volatility and that of the firm. Furthermore, the size of the firm and its market power contribute to the misalignment between the volatility of the firm's performance and the average one at the industry level.

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The bottom-up approach to risk-return analysis is rooted in the explication of firm's risk drivers coming from both the firm features and the environment where it operates. Internal drivers, which can be reached mainly from (current or expected) accounting data, arise as structural leverages, connected to the firm's real and financial structures. Conversely, environmental drivers are that part of volatility caused by competitive environment and thus qualify like determinants of business risk.

Adopting this perspective, the focus of the risk-return analysis concerns the combination of the firm's real/financial profile and its exposure to the degree of volatility inherent to its core business.

The main advantages of the bottom-up approach can be traced to:

- *greater differentiation of firms due to their strategic, industrial and financial features;*
- *the possibility to carry out risk-return estimation according to managerial logic, that is, oriented toward business control and planning, rather than short-term financial speculation;*
- *Solving practical problems on how to measure the systemic risk of unlisted companies, for which it is not possible to adopt in a straightforward way a top-down logic, based on the Market Model, which involves the estimation of a regression curvebased on the collection of historical data, referring to share prices.*

Furthermore, the bottom-up approach can be used for assessing the information efficiency of the capital market: the capital market capacity to discount fundamentals of listed firms is all the greater the more the results obtained using the bottom-up approach tend toward those resulting from the use of top-down one (Market Model). However, when comparing bottom-up estimates with top-down ones, consideration must be given to the subjective utility functions referring to different types of investors. For instance, in the case of an investor interested in short-term speculation, the effect exerted by corporate fundamentals on risk has a marginal relevance, in the sense that it is relevant only to the extent that corporate fundamentals produce short-term consequences on returns and stock prices. In contrast, for an investor interested in long-term speculation and/or active participation in the management of the issuing firm, the relationship between firm risk and their structural variables takes on greater significance with respect to asset allocation decisions.

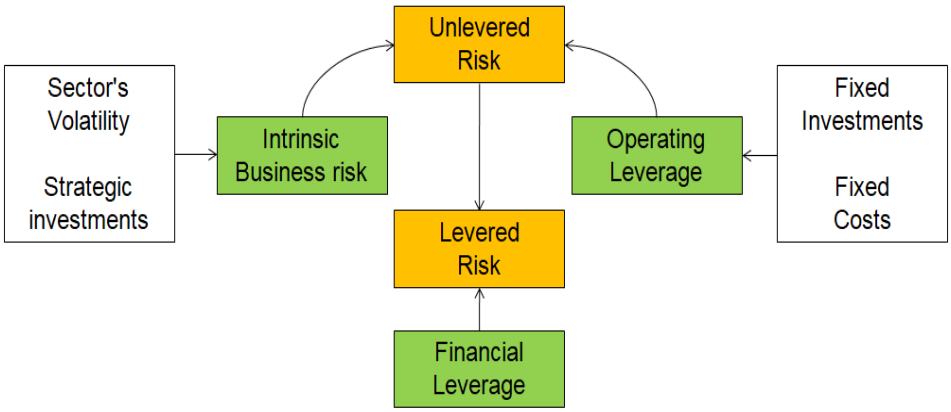
Thus, the bottom-up approach needs a twofold contextualization: objective contextualization related to the characteristics of the firm; subjective contextualization concerning the investor pursuing a given equity investment.

In the following paragraphs, we assume, on the one hand, the perspective of the investor interested in the link between a firm's structural characteristics and its exposure to risk and, on the other hand, the perspective of the firm's manager interested in breaking down the drivers of firms' corporate volatility in order to inquire the managerial actions that make possible a change to the firm's risk-return trade-off.

In general, the bottom-up approach enriches risk-return analysis through the explication of firm's parameters, and it appears necessary especially when firm's risk estimation does not pursue strict financial objectives but qualifies as a decisional support tool.

Studies in bottom-up analysis (see among others: Blazenko, 1996; Griffin, Dugan, 2003; Hill, Stone, 1980; Huffman, 1989; Mandelker, Rhee, 1984; Peterson M. A., 1994; Renzi, 2012; Renzi, Sancetta, Orlando, 2012; Rubinstein, 1973) have identified intrinsic business risk, degree of operating leverage, and financial leverage as drivers of firm's risk (Figure 1).

Fig. 1: Firm's risk drivers



Intrinsic business risk concerns the volatility of revenues (thus the volatility related to demand and unit selling prices), induced by business choices and/or environmental factors. According to Chung (1989), every firm faces an intrinsic business risk mainly due to the cyclicality of its industry. From this perspective, intrinsic business risk emerges as an exogenous risk with respect to managerial choices.

When intrinsic business risk originates from exogenous forces, it is also referred to as environment risk (Pellicelli, 2004). Assuming this logic and reasoning in terms of systematic risk, unlevered beta is strongly influenced by intrinsic business risk, as the volatility that at any given time acts across all enterprises belonging to a certain industry.

However, Ross, Westerfield, and Jaffe (2002) have remarked that revenue volatility can also be caused by endogenous items. For instance, a firm's high propensity for innovation generates discontinuities regarding the sales volumes and prices it is able to pursue. This is true, for example, when the search for innovative products and/or processes is carried out internally through intensive R&D (Ho, Xu, Yap, 2004, p. 400).

However, it appears complex to make a sharp decomposition of intrinsic business risk into two distinct areas: the area of exogenous intrinsic business risk and that relating to the endogenous one. These areas, in fact, may have correlations, positive or negative, that are particularly fuzzy.

In the presence, for example, of radical innovations promoted by the company and parallel instability of certain macroeconomic or industry's factors, it is complex to establish the extent to which demand volatility is due to company decisions, or to dynamics that cannot be governed at the level of an individual firm. On the other hand, it is proper to assume that in some circumstances the endogenous and exogenous components of intrinsic business risk assume inverse trends. This could occur when innovation isolates the firm from external volatility factors. Consider, for example, the case of a product innovation whereby the firm creates a new target market. In this hypothesis, on the one hand, the firm self-generates a process of intrinsic business risk, due to the discontinuity inherent in the innovation; on the other hand, the firm eliminates the risk associated with the cyclicality of demand characterizing the initial industry to which it belongs.

Anyway, the intensity of intrinsic business risk on the volatility of operating results depends on the rigidity of costs and, therefore, on the structural profile of the firm. As fixed costs increase, in fact, the elasticity of EBIT (operating income) to sales revenues increases. This elasticity depends on the degree of operating leverage, which arises as an internal item of corporate performance volatility. The degree of operating leverage generates greater volatility in operating results than intrinsic business risk: in the case of high levels of operating leverage, small changes in revenues cause high percentage changes in EBIT. Firms operating with a higher leverage level than the average industry one have an advantage over their competitors in terms of potential exploitation of economies of scale, under conditions, however, of higher unlevered risk. Therefore, this kind of leverage takes on a twofold significance with respect to the evolutionary dynamics of the firm: it highlights the possibility, on the one hand of achieving improvements in profitability by leveraging sales, and on the other hand of not being able to adjust fixed costs to possible negative economic trends (Brigham, 1995, p. 425).

In summary, the combination of intrinsic business risk and operating leverage gives rise to unlevered risk (or operating risk), which is the volatility of firm performance tied to investments in real assets.

In unlevered conditions, endogenous equity cost management can take place within the limits of operating leverage maneuverability. These limits mostly depend on the three following factors: sunk costs which are the barriers to exit from certain activities; a minimum level of slack resources necessary to ensure the company's ability to adapt to new; scenarios and/or rapidly exploit growth opportunities; the expectations of stakeholders inside and outside the firm that often push management to accept, in order to safeguard "relational capital", losses in economic efficiency.

In levered conditions, financial risk must be added to unlevered risk, i.e., the instability that the capital structure produces on economic dynamics and the degree of capital placed to cover firm risk. To obtain the levered risk (total risk), it is necessary also to consider the effects that financing decisions of corporate assets have on the variability of net results and the adequacy of equity. This means that debt acts positively on the shareholder's minimum expected return (Modigliani, Miller 1958). Moreover, at a certain level of financial leverage the capital structure also amplifies the return expected by creditors because of the risk of financial distress, i.e., the possibility that the firm's equity may not be sufficient to cover large economic losses; in addition, there are additional costs, coming from the link between over-indebtedness of the firm and loss of trust in it by business stakeholders.

Purpose of the paper. *The paper's purpose is to conceptualize, in both quantitative and logical terms, the link between positive or negative shocks in demand and the firm's ability to exploit such shocks in terms of risk-return arbitrages.*

Methodology. *We adopt a theoretical methodological approach, which will be empirically tested in subsequent works. However, in developing our theoretical model we refer to the relationships between independent variables and the risk-return profile of the firm that have already been tested empirically and are easily demonstrated even through simple simulations.*

We begin by modeling the bottom-up approach to firm's unlevered risk analysis against shocks in market demand. In the following analysis we assume ROI (return on net investments) volatility as a proxy of unlevered specific risk (σ_u). In particular, given a certain probability's distribution, the IBR equals to:

$$\sigma_u = \sqrt{\sum_{i=1}^{n} p_i (ROI_i - \widetilde{ROI}_i)^2} \quad [1.\mathrm{a}]$$

Where ROI is given by the ratio between EBIT (Earnings Before Interest and Taxes) and NI (net investments). $\widetilde{ROI}$ is the notation about expected average ROI over n scenarios:

$$\widetilde{ROI} = \sum_{i=1}^{n} p_i(ROI_i)$$

Assuming historical data as proxy of expect results, σ_u is given by:

$$\sigma_u = \sqrt{\frac{\sum_{i=1}^{n} p_i(ROI_i - \widetilde{ROI}_i)^2}{n}} \quad [2.\mathrm{a}]$$

Equations [1] and [2] can be broken down as a function of intrinsic risk, degree of operating leverage and ROI's level.

The intrinsic business risk (IBR) is normally measured as a standard deviation of revenues (V) calculated stochastically or on historical data:

$$IBR = \sqrt{\left(\sum_{i=1}^{n} p_i\left(V_i - \tilde{V}\right)\right)^2} \quad [3]$$

Where $\tilde{V}$ is the notation about average expected revenue:

$$\tilde{V} = \sum_{i=1}^{n} p_i(V_i)$$

Or assuming historical data as proxy of expect results, IRR is given by:

$$IBR = \sqrt{\left(\sum_{n=1}^{n} \frac{(Vi - \bar{V}}{n}\right)^2} \quad [4]$$

Where $\bar{V}$ is the notation about average revenue historically archived.

The Degree of Operating Leverage (DOL), as an endogenous driver of EBIT variability, can be measured by adopting a direct or an indirect approach. Adopting the directapproach, DOL is measured in the period between t_0 and t_1, as follows:

$$DOL = \frac{\frac{\Delta EBIT}{EBIT_{t0}}}{\frac{\Delta V}{V_{t0}}} = \left(\frac{\Delta EBIT}{EBIT_{t0}}\right)\left(\frac{V_{t0}}{\Delta V}\right) \quad [5]$$

Where EBIT is earnings before interest and taxes (operating income) and V sales revenue.

Imagining carrying out the analysis at time t_0, the application of Equation [5] requires estimating the expected trends of EBIT and V.

The indirect approach, on the other hand, allows us to determine the above elasticity degree by using values already accounted (Dugan, Shiver, 1992). This approach of estimatingoperating leverage assumes that the expected change in revenues is realized at the same fixed costs (FC), and unit contribution margin equal to the difference between the unit selling price (p) and the variable unit cost (c).

Specifically, because $EBIT_{t0} = V_{t0} - VC_{t0} - FC_{t0} = Q_{t0}(p - c) - CF_{t0}$, the Equation [5] can be replaced, in terms of Potential Degree of Operating Leverage (DOL_P):

$$DOL_P = \left(\frac{\Delta EBIT}{EBIT_{t0}}\right)\left(\frac{V_{t0}}{\Delta V}\right) = 1 + \frac{FC}{EBIT_{t0}} \quad [6]$$

With constants CF and p-c; non-constants Q

Where: Q are the quantities produced and sold; p - c is contribution margin per unit, and VC are variable costs (cQ).

Equation [6] shows that firm's vulnerability against shock in demand of its output mainly depends on fixed costs, as the elasticity of operating results to revenues mostly depends on the degree of cost rigidity (Ho, Xu, Yap, 2004, p.

396). For example, two firms working in the same industry with equal competitive ability but differentiated in terms of the incidence of fixed costs as a percentage of total costs, are characterized by a different elasticity of operating results to demand trends (De Medeiros, Gustosa, Dantas, 2006).

Now, maintaining the assumption of constants contribution margin per unit (p-c), net investments (NI) and fixed costs, the unlevered risk (σ_u), i.e. the standard deviation of ROI, can be decomposed as follows:

$$\sigma_u = \sqrt{\sum_{i=1}^{n} p_i \left(ROI_i - \widetilde{ROI}\right)^2} = \frac{IBR}{\widetilde{V}} \cdot \left|DOL_P\right| \cdot \left|\widetilde{ROI}\right| =$$

$$= \frac{IBR}{\widetilde{V}} \cdot \left|1 + \frac{FC}{\widetilde{EBIT}}\right| \cdot \left|\widetilde{ROI}\right| \qquad [1.b]$$

In Equation [1.b], both the potential degree of operating leverage and the average expected ROI are calculated in absolute value, as volatility only makes logical sense if it takes on positive or zero value[5].

Basically, Equation [1.b] consists of transforming the analysis of operating elasticity into that of unlevered volatility.

Both Equations [1.b] and [2.b] are consistent with the risk-return logic. Indeed, the average ROI, calculated as an expected probabilistic value or deriving from the observation of historical data, is positively correlated with the standard deviation σ_u. According to Equation [1.b], the average expected ROI is given by:

$$\widetilde{ROI} = \frac{\sigma_u}{\frac{IBR}{\widetilde{V}} \cdot DOL_P} \qquad [7]$$

Basically, Equation [7] expresses the positive or negative expected return as the transformation rate of the risk drivers into unlevered volatility, caused by expected volatility of market demand.

Results. *The management can use the above risk-return decompositions in order to reach the proper trade-off between operating profitability and unlevered volatility, linked just to dynamic of goods' demand, taking into account the firm's evolutionary phase, its strategic objectives, and the related risk propensity of the shareholders. In other words, the proposed approach allows the search for optimal conditions (in both objective and subjective terms) about the firm's risk-return profile, by acting on firm's fundamentals.*

Of course, the maneuverability of independent variables is not absolute. For instance, the reduction in fixed costs, aimed at decreasing the dependence of ROI dynamic to market demand volatility, should be carried out in compliance with constraints concerning the minimum production necessary to satisfy current and/or estimated demand, the carrying out of administrative and other activities, different forms of sunk costs, etc. Also, strategies focused on an increase of expected ROI would be done taking into account several limits, especially in terms of the maximum level of sustainable unlevered volatility.

Furthermore, in Equation [7] the expected ROI is expressed recursively with respect to its determinants, the latter in turn related to each other. For example, each choice concerning the fixed costs' size acts simultaneously on: EBIT (therefore on ROI) and DOL_P. The same reasoning works with respect to other independent variables, such as expected sales revenues, variable costs, price and cost per unit.

Therefore, the risk-return optimization against market demand volatility arises as a kind of managerial puzzle, where the search for the proper combination between expected average ROI and unlevered volatility can be carried out through an arbitrage's perspective between the variables in play. This approach requires as fundamental conditions the ROI's growth without new investments and incremental risk. Indeed, an arbitrage advantage arises when the economic agent can increase his or her profitability, keeping stable both volatility and the amount of capital employed.

Given the level of net investments, the risk-return relationship improves with each improvement in internal efficiency. In other words, rationalization processes in the use of internal resources lead to an increase in the expected average ROI for a given of unlevered risk. In this vein, risk-return optimization depends strongly on the exploitation of margins efficiency in internal resources. It implies a possible arbitrage profit typically linked to a rationalization at an organizational level or to processes of fixed costs' externalization, for example, through the outsourcing of activities that stiffen operating costs, i.e., activities acting positively on potential operating leverage.

On the other hand, the ROI's growth is based on an improvement in contribution margin, deriving for example from a greater price per unit as a consequence of higher costumers' awareness about the intrinsic value of the goods produced by the firm. It arises as incomplete arbitrage since the increase in ROI corresponds to an increase in unlevered risk.

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5 Obviously, if such variables are positives, it is not necessary to use the absolute value notation (| …|).

Therefore, in the context of a static analysis, where fixed costs can vary since firm's structure changes but within the chosen structure remain constant against the scenarios associated with the expected demand, these kinds of arbitrages are framed as follows:

- *complete arbitrage, i.e., growth in expected ROI, linked to a lower level of fixed costs which is assumed as constant for each scenario regarding expected demand;*
- *incomplete arbitrage, i.e., growth in expected ROI, linked to a higher level of contribution margin (sales revenue - variable costs).*

Formally, assuming growth in expected ROI and positive DOL_P, the complete arbitrage can be framed as follows:

<u>*Complete arbitrage*</u>

$$\sigma_{u(\text{st.B})} = \sigma_{u(\text{st.A})}$$

$$\frac{IBR}{\tilde{V}} \cdot \left(1 + \frac{FC_{(\text{st.B})}}{EBIT_{(\text{st.B})}}\right) \cdot \widetilde{ROI}_{(\text{st.B})} - \frac{IBR}{\tilde{V}} \cdot \left(1 + \frac{FC_{(\text{st.A})}}{EBIT_{(\text{st.A})}}\right) \cdot \widetilde{ROI}_{(\text{st.A})} = 0$$

$$\left(1 + \frac{FC_{(\text{st.B})}}{EBIT_{(\text{st.B})}}\right) < \left(1 + \frac{FC_{(\text{st.A})}}{EBIT_{(\text{st.A})}}\right); \ \widetilde{ROI}_{(\text{st.B})} > \widetilde{ROI}_{(\text{st.A})}$$

Where st.A and st.B are notations of firm's state A and firm's state B, each characterized by a certain level of fixed costs.

In the case incomplete arbitrage, the growth in expected ROI coming by an increase in the contribution margin determines the following risk-return effect into the same firm state (stA; stA):*

<u>*Incomplete arbitrage*</u>

$$\sigma_{u(\text{st.A*})} > \sigma_{u(\text{st.A})}$$

$$\frac{IBR}{\tilde{V}} \cdot \left(1 + \frac{FC_{(\text{st.A*})}}{EBIT_{(\text{st.A*})}}\right) \cdot \widetilde{ROI}_{(\text{st.A*})} - \frac{IBR}{\tilde{V}} \cdot \left(1 + \frac{FC_{(\text{st.A})}}{EBIT_{(\text{st.A})}}\right) \cdot \widetilde{ROI}_{(\text{st.A})} > 0$$

$$\widetilde{ROI}_{(\text{st.A*})} > \widetilde{ROI}_{(\text{st.A})}$$

The above arbitrage types (complete and incomplete arbitrage) are based on the idea that the firm can assume different structural states, each characterized by a stable level of fixed costs. When the expected ROI's growth depends on a change in the structural state, thanks to the achievement of efficiency objectives in terms of reduction in fixed costs, an optimization process arises, i.e., expected ROI's growth for a given level of risk. Conversely, when the expected ROI's growth does not envisage a new structural state, therefore is pursued without changing the level of fixed costs, the arbitrage is limited, as the expectation of growth in profitability implies greater unlevered risk. As a result, an incomplete arbitrage derives from the decision to increase the expectation of profitability, without making new investments but increasing the level of unlevered risk with respect to demand volatility.

Assuming full management awareness of the risk-return effects, actions aimed at incomplete arbitrage characterize firms with a high propensity to support a higher unlevered risk for taking a higher operating profitability. However, it would be wrong to frame complete and incomplete arbitrage only from a subjective point of view. Indeed, complete and incomplete arbitrages depend on several objective factors such as the actual possibility to reduce fixed cost, the maneuverability of purchase and sales prices, technological innovations, etc.

Furthermore, the above considerations regarding arbitrage in terms of risk-return trade-off must be contextualized in a medium-long term perspective. For instance, the benefit, in terms of risk-return trade-off, deriving from a reduction in fixed costs could, in the medium run, lead to a decrease in profitability. It could happen if this manner to improve efficiency would reduce the key resources on which the firm can leverage to maintain or improve its competitive advantage.

Simulations of complete and incomplete arbitrages

State A

Probility (p_i)	Q_i	Price per unit	V_i	$(p_i)V_i$	Contribution margin per unit	Fixed costs (FC)	$EBIT_i$	$(p_i)EBIT_i$	Net investments	ROI_i	$(p_i)ROI_i$	$(p_i)(ROI_i - ROI')^2$
0.25	120	6	720	180	3	220	140	35	640	0.219	0.055	0.0004
0.15	134	6	804	120.6	3	220	182	27.3	640	0.284	0.043	0.0016
0.18	125	6	750	135	3	220	155	27.9	640	0.242	0.044	0.0007
0.12	88	6	528	63.36	3	220	44	5.28	640	0.069	0.008	0.0015
0.3	96	6	576	172.8	3	220	68	20.4	640	0.106	0.032	0.0017

	State A
Expected average V (V')	671.760
Varinace of V	9537.782
IBR	97.662
Expected average EBIT (EBIT')	115.880
Expected average ROI	0.181
Varinace of ROI	0.006
Unlevered risk (σ_u)	0.076
DOL_P = 1+ FC/ EBIT'	2.899
IBR/V'	0.145
σ_u /[(IBR/V')(DOL_P) = Expected average ROI	0.181

From state A to state B (complete arbitrage): reduction in fixed costs; increase in expected ROI; constant unlevered volatility

Probility (p_i)	Q_i	Price per unit	V_i	$(p_i)V_i$	Contribution margin per unit	Fixed costs (FC)	$EBIT_i$	$(p_i)EBIT_i$	Net investments	ROI_i	$(p_i)ROI_i$	$(p_i)(ROI_i - ROI')^2$
0.25	120	6	720	180	3	200	160	40	640	0.250	0.063	0.000355
0.15	134	6	804	120.6	3	200	202	30.3	640	0.316	0.047	0.001601
0.18	125	6	750	135	3	200	175	31.5	640	0.273	0.049	0.000673
0.12	88	6	528	63.36	3	200	64	7.68	640	0.100	0.012	0.001514
0.3	96	6	576	172.8	3	200	88	26.4	640	0.138	0.041	0.001679

		State B - State A
Expected average V (V')	671.76	0.0000
Varinace of V	9537.782	0.0000
IBR	97.66157	0.0000
Expected average EBIT (EBIT')	135.880	20.0000
Expected average ROI	0.212	0.0313
Varinace of ROI	0.006	0.0000
Unlevered risk (σ_u)	0.076	0.0000
DOL_P = 1+ FC/ EBIT'	2.472	-0.4266
IBR/V'	0.145382	0.0000
σ_u /[(IBR/V')(DOL_P) = Expected average ROI	0.212	0.0313

Change into state A (incomplete arbitrage): increase in unit sales price; increase in expected ROI and unlevered volatility

Probility (p_i)	Q_i	Price per unit	V_i	$(p_i)V_i$	Contribution margin per unit	Fixed costs (FC)	$EBIT_i$	$(p_i)EBIT_i$	Net investments	ROI_i	$(p_i)ROI_i$	$(p_i)(ROI_i - ROI')^2$
0.25	120	8	960	240	5	220	380	95	640	0.594	0.148	0.00099
0.15	134	8	1072	160.8	5	220	450	67.5	640	0.703	0.105	0.00445
0.18	125	9	1125	202.5	5	220	405	72.9	640	0.633	0.114	0.00187
0.12	88	8	704	84.48	5	220	220	26.4	640	0.344	0.041	0.00420
0.3	96	8	768	230.4	5	220	260	78	640	0.406	0.122	0.00466

		Change into state A
Expected average V (V')	918.18	246.420
Varinace of V	23956.71	14418.925
IBR	154.7795	57.118
Expected average EBIT (EBIT')	339.800	223.920
Expected average ROI	0.531	0.350
Varinace of ROI	0.016	0.010
Unlevered risk (σ_u)	0.127	0.051
DOL_P = 1+ FC/ EBIT'	1.647	-1.251
IBR/V'	0.168572	0.023
σ_u /[(IBR/V')(DOL_P) = Expected average ROI	0.458	0.277

Ultimately, based on our theoretical model, we argue that structural flexibility allows to increase the expected profitability for a given level of risk, the latter considered in terms of symmetric volatility. In particular, given the volatility in expected demand, the results deriving from our theoretical are the following: the decomposition of idiosyncratic operating risk; the identification of possible risk-return arbitrages. In this regard, our theoretical framework suggests two kinds of risk-return arbitrage: first, complete arbitrage that arises when, for a given level of unlevered risk, the growth in operating profitability occurs; second, incomplete arbitrage that arises when the growth in operating profitability is offset by a positive change in unlevered risk.

These kinds of risk-return arbitrage are closely linked to the firm's ability to combine a potential positive shock in sales revenues to structural efficiency improvements achievable in terms of internal processes or through outsourcing

mechanisms. In the opposite situation, that is, of a potential reduction in market demand, structural flexibility emerges as a sort of real option capable of partially immunizing the firm against potential crisis conditions.

Research limitations. *The paper represents the starting point for future research. Therefore, its main limitations are the lack of an empirical test about the proposed model and some simplifications about the dynamic of key variables.*

Managerial implications. *Our theoretical risk-return modeling allows us to look at risk-return trade-off according to managerial logic, that is, oriented toward business control and planning, rather than short-term financial speculation. Furthermore, our theoretical proposal assumes managerial importance, as it provides the tools to maneuver the risk-return trade-off, seeking optimal conditions from both a subjective and objective points of view, the latter linked for example to the risk propensity of management.*

With regard the proposed arbitrage puzzle, our approach could allow firms to scale operations up or down based on demand fluctuations, minimizing exposure to negative demand shocks while maintaining efficiency during positive demand spikes. Likewise, managers can optimize the DOL by reducing fixed costs during periods of high market volatility, and increase fixed costs during periods of stable or growing markets. Finally, implementing a dual arbitrage strategy. Under complete arbitrage, managers should prioritize structural efficiency improvements to achieve higher expected ROI without additional risk (e.g., reducing fixed costs through automation or outsourcing); whereas under incomplete arbitrage, when demand allows, firms can increase contribution margins through price adjustments, but they must accept a higher unlevered risk. Therefore, the proposed theoretical framework assumes particular relevance in a logic of ambidextrous organization, in terms of adopting exploration and exploitation strategies with respect to demand positive and negative shocks (Tushman, O'Reilly III, 1996; He, Wong, 2004; Gatti, Volpe, Vagnani, 2015).

Originality of the paper. *The paper, although linked to previous theories and models, develops a new risk-return modeling that can lead to a reworking in the risk management of non-financial firms as well as in the firm's evaluation processes with particular reference to the cost of capital estimation.*

Key words*: shock in demand sales; unlevered risk; risk-return arbitrage; bottom-up approach*

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Managerial Capabilities Revisited: A Bibliometric Journey Through Theory and Practice

MARIA GRAZIA STRANO[1]

Abstract

This paper provides a domain-based literature review of managerial capabilities, based on a bibliometric analysis, aiming to synthesize existing research and delineate potential future research trajectories. In an evolving and increasingly competitive business environment, firms must continuously adapt, positioning managerial capabilities as a pivotal element in sustaining competitive advantage. This study explores the theoretical evolution of managerial capabilities, distinguishing between dynamic capabilities - concerned with resource reconfiguration - and managerial capabilities, which encompass strategic decision-making, leadership, and the optimal allocation of resources.

The literature review highlights the interplay of managerial cognition, social capital, and human capital in the development of dynamic capabilities, and wants to answer the following research questions: What are the main topics related to managerial capabilities research, and how have these topics evolved over time? Which major theories can be applied to explain them?

Findings indicate a transition from conventional human capital theories to a more refined conceptualization of dynamic managerial capabilities. Furthermore, the study underscores the influence of external factors - such as digital transformation and market changes - on managerial roles and competencies. This research contributes to both academia and managerial practice, offering insights that can inform management training programs and policy development. It highlights the necessity of cultivating managerial capabilities that foster agility, innovation, and resilience within organizations.

Methodologically, the study follows a bibliometric approach, leveraging the Scopus and Web of Science databases while adhering to the PRISMA protocol. A sample of 190 peer-reviewed articles was examined using VOS Viewer and Bibliometrix software, revealing six thematic clusters, including managerial work, dynamic capabilities, compensation, and strategic transformation.

Although the study adheres to a rigorous methodological framework, certain limitations must be acknowledged, including potential selection biases and the rapidly evolving nature of the field. Nevertheless, this research serves as a foundational study, offering an integrated theoretical perspective that bridges existing gaps and provides a structured pathway for future inquiries into managerial capabilities.

Framing of the research. *In an ever-changing world, organizations need to keep up with the competitive environment for their survival and growth. In the last decades, the management and strategy literature has given more space to the study of managerial capabilities, due to their contribution to the firms' success in dynamic and competitive business landscapes (Teece, 2007; Helfat & Martin, 2015).*

Teece (2014, p. 328) *was the first to introduce in the management literature the concept of "capability", defining it as "a set of current or potential activities that utilize the firm's productive resources to make and/or deliver products and services". Whether ordinary or dynamic, these capabilities can be acquired through both organizational resources and histories, giving the chance to respond to changes in the environment* (Teece, Pisano, & Shuen, 1997). *A key element of the debate concerns the relationship between dynamic capabilities and managerial capabilities; while the former is tied to the company's ability to reconfigure its resources, the latter is generally defined as the set of skills, knowledge and experience that managers use to make strategic decisions, drive change and optimise corporate resources* (Adner & Helfat, 2003). *Thanks to their competences, managers can make decisions and manage resources, playing a central role in the business.*

The process of developing dynamic capabilities is highly dependent on the decisions and actions of managers, who find new value-enhancing combinations by aligning specialized assets; indeed, according to Teece (2007), *the three key functions of dynamic capabilities (sensing, seizing and transforming) have to be possessed by managers and executives to recognise the opportunities, transform them into strategic actions and adapt them. Giving a broader explanation of these capabilities, sensing refers to the company's ability to detect changes in the market, new technological opportunities, customer needs or emerging threats. If the managers have strong analytical and cognitive skills, strategic*

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vision, and external relations to gather critical information from partners, customers, competitors and institutions, they will be able to spot the opportunities before competitors. Once identified, managers' decision-making skills, leadership, and resource management allow the organisation to seize the chance for capitalising on it through investments, innovative approaches, and new strategies. Finally, because companies must continually adapt to change, they must implement resource reconfiguration and organisational adaptation (transforming). For this reason, executives must have skills that enable them to redefine processes, train employees, acquire new competencies and adapt the corporate culture (Teece, 2007). *Since managers drive the sensing, seizing and transforming processes, it could be said that dynamic capabilities do not exist without managerial capabilities. Improving managerial capabilities means making the organisation more agile, innovative and resilient.*

Notably, it is valuable to mention that while some studies adopt an organisational perspective, examining how managerial capabilities translate into dynamic business capabilities and influence the competitive advantage of the company (Eisenhardt & Martin, 2000; Augier & Teece, 2009; Teece, 2012), others focus on the individual level, analysing the role of managers in strategic development with its specific competences (Adner & Helfat, 2003; Helfat & Martin, 2015; Helfat & Peteraf, 2015). Among these, Adner and Helfat (2003) *pinpointed three essential foundations of dynamic managerial capabilities (DMC) that facilitate the orchestration of strategic change: managerial cognition, managerial social capital, and managerial human capital, which can be summarised as follows:*

- *managerial cognition: mental models and beliefs, mental processes, and emotions.*
- *managerial social capital: relationships, both formal and informal, that managers establish with individuals and can be used to obtain resources and information.*
- *managerial human capital: all the core characteristics that human capital comprises.*

Not only can these three aspects singularly characterise managers and their strategic actions but also associated with each other (Adner & Helfat, 2003). *In addition to this, external factors such as digital transformation, sustainability and global crises (e.g. COVID-19 pandemic) are redefining the role of managerial capabilities, introducing new challenges for managers.*

The above discussed represent the main theoretical foundations of managerial capabilities. Remarkably, the literature in this regard is fragmented; indeed, strategic success can be explained differently and with a different lens, depending on the aspects, strategies, resources and actors employed in the process. Furthermore, while the dynamic capabilities perspective focuses generally on their impact on strategic change, dynamic managerial capabilities theory proposes to investigate the managerial impact on strategic change. This theoretical fragmentation can be considered one of the gaps in the literature. Similarly, previous studies mainly address the listing or effect of certain capabilities, without exploring the extent to which managers' capabilities spread and are absorbed by the organisation. Finally, prior research suggests that there are sectoral differences in the effectiveness of DMCs, but there are not enough studies, for example, that explore whether different public sector institutions, such as municipalities, might require different managerial capabilities than others. For this reason, this bibliographic literature review includes within it studies that apply different frameworks and measurements, and that belong to various sectors, to structure this knowledge and lay the foundation for advancing it.

To sum up, this literature review aims at synthesising the state of the art of research, identifying key theoretical perspectives and proposing future directions for the study of managerial capabilities.

Purpose of the paper. *Managerial capabilities represent a key element in the managerial and strategic research landscape, as they directly influence the ability of firms to achieve and maintain a sustainable competitive advantage* (Adner & Helfat, 2003). *Although numerous studies have been conducted on this topic in recent years, the literature appears fragmented and characterised by heterogeneous theoretical approaches* (Helfat & Martin, 2015). *This fragmentation is given by the different approaches used to conceptualize, assess and evaluate the managerial competences in the various fields and sectors, making challenging the generalizations, as well as the comparisons. Additionally, the separation between dynamic capabilities and dynamic managerial capabilities has resulted in distinct research paths that do not always intersect, leaving important questions about their relationship and boundaries unresolved. In this regard, some yet unexplored aspects concern the development of DMCs (whether they are innate in managers or whether and how they can be developed), how they are used by organisations, how their impact on strategic success can be assessed, what role the manager's experience plays in the development of certain skills. It would also be interesting to investigate the extent to which DMCs help to overcome organisational rigidity and promote change and innovation. Finally, there is a lack of studies exploring how the internal and external context modulates the effectiveness of DMCs, where internal context, for example, refers to corporate culture and governance, and external factors such as geographical and cultural differences, market and regulatory changes. Hence, the purpose is to analyse the existing literature on managerial capabilities, providing a structured overview of the research conducted to date, and therefore try to unite both theoretical strands to give a single theoretical view on this topic, suggesting unexplored areas for future study.*

Specifically, this study will map the existing literature on managerial capabilities, classifying studies according to their theoretical perspectives, with the aim of analysing the evolution of research over time and proposing a future research agenda. Moreover, thanks to this analysis, it will be possible to study how the concept has transformed in response to changes in the economic and technological environment, evaluating possible gaps in the literature. Bibliometric analysis is needed to examine the role of managerial capabilities within established theoretical frameworks, shedding light on the analysis of temporal trends in academic publications, and highlighting how key themes have

changed since the 1990s. Furthermore, it is possible to assess the most widely used research methodologies and identify areas where research is still limited or contradictory.

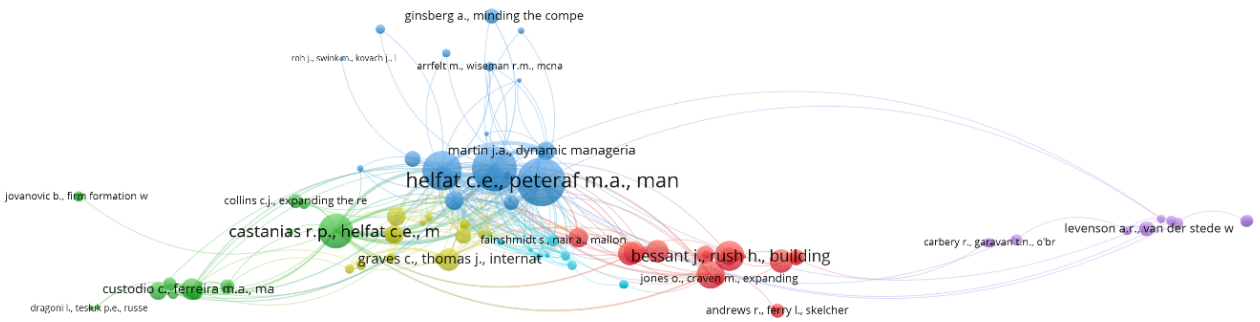
Methodologically, the study is based on the analysis of academic literature published in peer-reviewed journals, using the Scopus and Web of Science databases to scrutinize the most relevant contributions. The application of software such as VOS Viewer and Bibliometrix will offer the chance to critically assess previous studies and thematic evolutions, highlighting emerging trends and potential areas for future development. In this context, using a bibliometric approach provides a clear advantage, allowing for a systematic and objective mapping of the field by identifying key scholars, dominant theories, and emerging research trends. Unlike traditional literature reviews, which mainly offer a qualitative summary, bibliometric analysis takes a data-driven approach to track how discussions on managerial capabilities have evolved over time and pinpoint areas that need further exploration. By applying advanced bibliometric techniques, this study moves beyond simply summarizing existing research, offering a deeper look into the structure of the field, uncovering theoretical links, highlighting gaps, and suggesting new directions for future studies.

The contribution of this research is threefold: to propose an up-to-date study that delves into the subject of managerial capabilities. Indeed, previous studies in the literature concern either dynamic capabilities or dynamic managerial capabilities, while the present study focuses on managers and their capabilities, both in the public and private spheres. The research offers practical implications for managers and policymakers. From an academic perspective, these findings add to the ongoing debate on the role and significance of managerial capabilities, shedding light on new directions for both theoretical exploration and empirical research. On a practical level, the study provides useful insights for managers and policymakers, helping them identify the most critical managerial capabilities in fast-changing business environments and offering guidance on how to strengthen them through focused leadership development and talent management initiatives. The analysis leads to a better understanding of managerial capabilities for driving change and innovation, giving insights for the development of management training programmes, and identifying which capabilities are most significant for success in business or public administration. By mapping key competencies, the research offers guidance on how organizations can enhance their leadership capabilities to foster agility, innovation, and resilience in dynamic environments. Finally, the study can propose an innovative theoretical model that synthesises the main contributions emerging from the literature, highlights theoretical connections and proposes new variables to be tested in future studies

Methodology. *To conduct this domain-based literature review, the guidelines indicated by Kraus* (2022) *and Paul and Criado* (2020) *were followed. This short paper reports a bibliometric analysis on which a systematic and critical analysis of articles dealing with 'managerial capabilities' will be developed later. The protocol applied for the selection of the articles is PRISMA. The databases used to search for articles were Scopus and Web of Science, showing papers that had the selected keywords in the title, abstract and authors' keyword published until 2024. These results were further filtered, considering business and economics as subject areas, English as language and peer-reviewed articles and reviews as document types. With this further selection, the search yielded 1178 results from Web of Science and 1855 from Scopus. The results were downloaded, duplicates removed and entered in an Excel sheet for mapping and analysis, resulting in a total of 2077 articles. By authors' choice, the ABS journal list was used, selecting articles in journals 3* and above. The list was reduced to 382 documents, which were individually studied by the authors, excluding articles that dealt with finance and did not have managers as their object of study. The authors also discussed a few doubts concerning the inclusion or exclusion of articles referring to different research areas, project managers and supply managers. After debating the reasons for inclusion, the decision was to consider the articles that developed these subjects in the corporate environment. This step reduced the sample of articles to 190. These were analysed with the VOS viewer software, considering articles that had at least 2 citations, bringing the selection down to 102 papers. The sample and individual clusters were then analysed with the software Bibliometrix.*

Results. *The final sample of articles contains 102 articles which, due to similarity, can be divided into 6 clusters (Figure 1).*

Fig. 1: Clusters from VOS Viewer



Analysing the total sample of the 102 articles, they span the period from 1981 to 2023. The three main sources are the Journal of Business Research, Strategic Management Journal and International Journal of Hospitality Management,

while the three main articles are Helfat and Peteraf's "Managerial cognitive capabilities and the microfoundations of dynamic capabilities" (2015), Adner and Helfat's "Corporate effects and dynamic managerial capabilities" (2003), and lastly, the one titled "Managerial resources and rents" by Castanias and Helfat (1991). *The first thing that stands out and can be deduced is that Helfat is recognized as one of the leading scholars in this field. Moreover, analysing these top three articles, it becomes evident that the first two focus on dynamic managerial capabilities, whereas the third article addresses managerial resources and their impact on a firm's competitive advantage. It highlights the relationship between managerial capabilities and corporate resources: indeed, the concept of Dynamic Managerial Capabilities (DMC) can be linked to the topic of corporate resources through the role of managers in recognising, configuring and transforming resources to generate and sustain a competitive advantage, linking back to the theoretical frameworks mainly used (resource-based view and dynamic capabilities). Corporate success relies not just on having resources, but also on managerial competence in deploying them effectively and efficiently.*

Focusing on the thematic map of keywords (Figures 2-3-4), it results in an evolution and specification of the concept of the human capital into capabilities and dynamic (managerial) capabilities. Figure 2 illustrates the thematic evolution of topics within the entire sample, dividing the analysis into two time periods with 2014 as a cutting point-chosen because the most influential article was published in 2015. Further detail provided in Figures 3 and 4 reveals specific topics and keywords addressed by previous studies in two distinct intervals: 1981-2014 and 2015-2023. These figures clearly show that while earlier research predominantly focused on concepts like 'resourcefulness' and related skills, in recent years, the scholarly attention has shifted substantially toward 'dynamic capabilities' and 'dynamic managerial capabilities'.

Fig. 2: Map - Thematic evolution

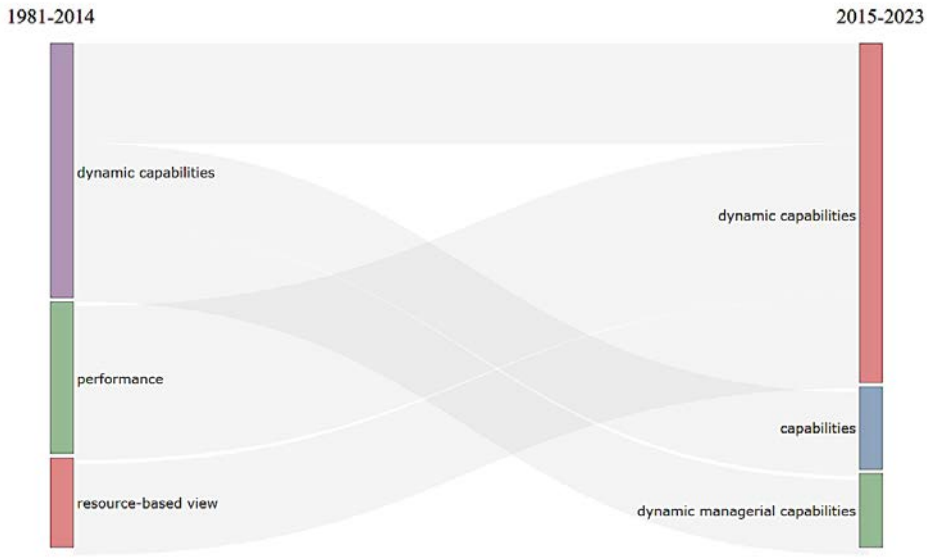


Fig. 3: Network - Thematic evolution (period 1981-2014)

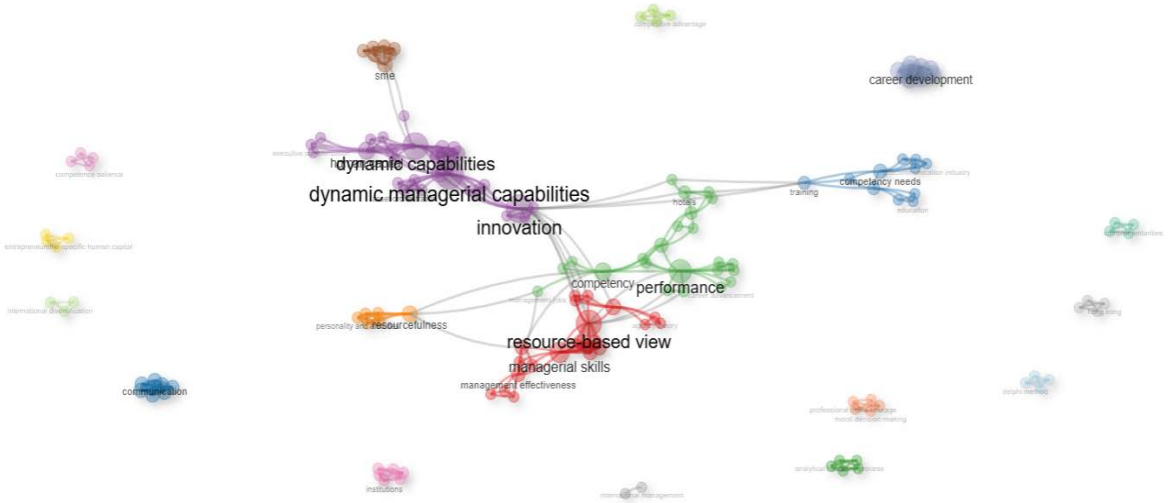
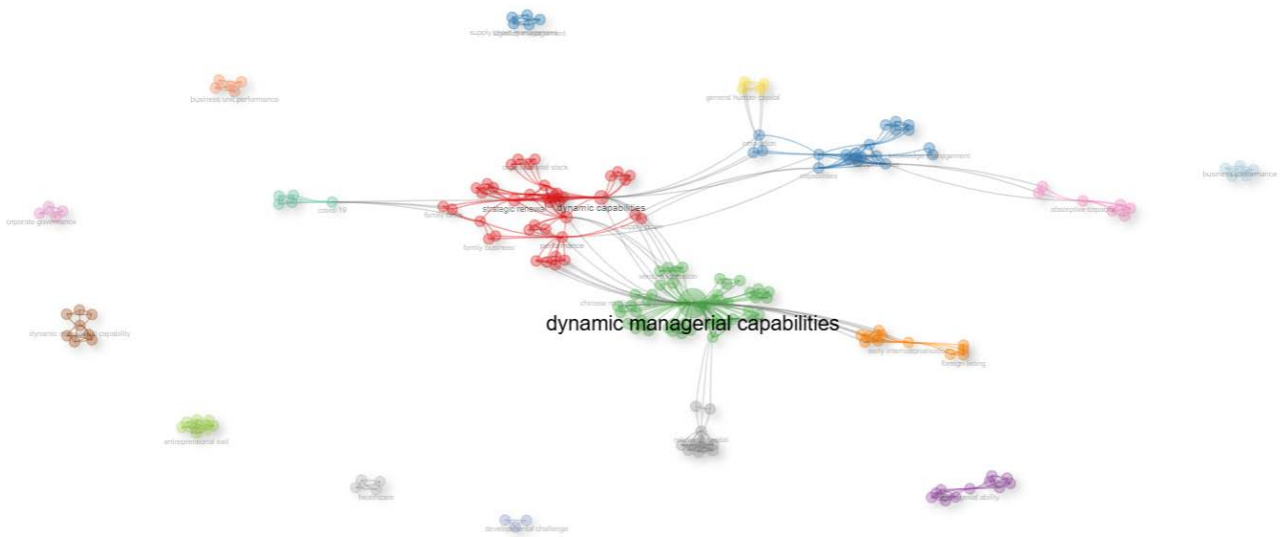


Fig. 4: Network - Thematic evolution (period 2015-2023)



Regarding individual clusters, an analysis was made by studying co-occurrence and co-citation. These are the clusters description, and the main results obtained:

- *Cluster 1: The managerial work*

This cluster is the biggest one, with 21 documents. Although the co-occurrence reports keywords such as 'performance' and 'resource-based view', the co-citation emphasises that the most cited articles concern the nature of managerial work.

- *Cluster 2: Dynamic managerial capabilities and compensation*

This cluster comprises 19 articles. In this case, there appears to be a moderate alignment between co-occurrence and co-citation patterns. In fact, the most recurring keywords and the most cited articles deal with dynamic managerial capabilities and compensation of managers.

- *Cluster 3: Dynamic Managerial Capabilities*

This cluster, with 19 articles, is the one only focused on dynamic managerial capabilities and resource assets.

- *Cluster 4: Dynamic (Managerial) Capabilities and family firms*

It contains 16 articles exploring dynamic capabilities and Dynamic Managerial Capabilities (DMC), specifically focusing on their application within family firms and examining how these capabilities can enhance firm performance.

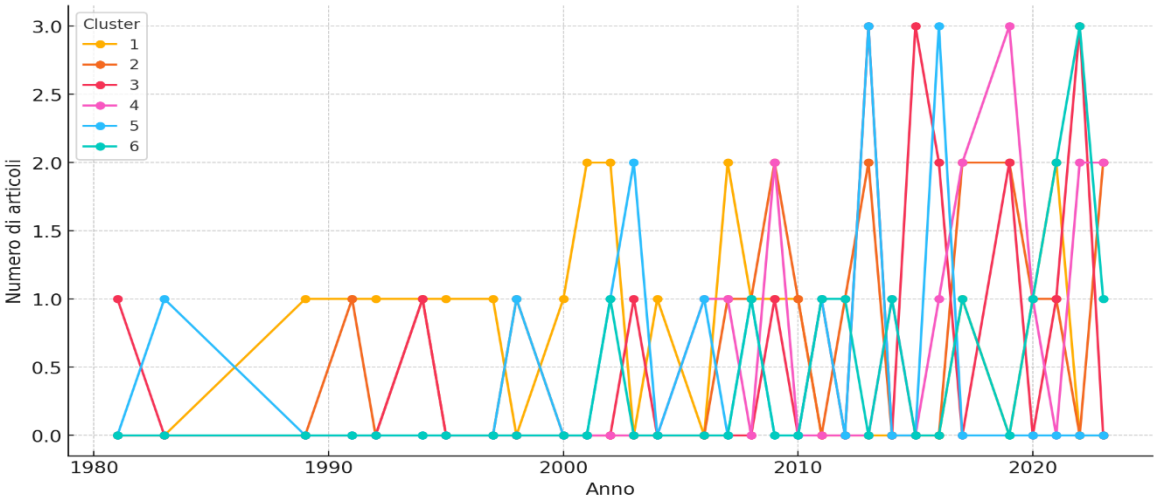
- *Cluster 5: The traits of supply chain managers*

The 14 articles of this cluster are mainly about managerial competences in supply chain management and logistics. Articles with project managers as subject matter have also been brought together in this cluster.

- *Cluster 6: Capabilities for the strategic change*

The analysis carried out on this cluster reports interesting data, as the 13 articles link the literature on dynamic capabilities and DMC to strategic change. In a nutshell, the articles develop how DMCs can be applied to bring about strategic change within public and private organisations.

Fig. 5: Evolution of the research studies per cluster



A key aspect in the study of these clusters is to identify their relationships, evolutions (Figure 5) and possible gaps. The first link that can be evaluated is between clusters 3 and 6. Both focus on the role of dynamic capabilities in innovation and strategic change management. In recent years, the number of articles in this area has seen a significant increase, suggesting a growing interest in the role of adaptive management in innovation, digital transformation and business crisis response. Future research could explore how these capabilities influence the resilience of companies in contexts of high uncertainty. Clusters 1 and 2, on the other hand, whose research production has been growing steadily, show that the link between corporate resources, human capital and performance is still a topic of interest for organisations. The explanation for this trend may lie in the fact that organisations have an interest in knowing how to manage human capital, skills, compensation levels and diversity on company boards in a balanced way. One potential area of research could be examining how human capital affects a company's ability to innovate. Lastly, in clusters 4 and 5 managerial skills play a key role in the management of family businesses and logistics, and their ability to adapt to economic, technological and market changes. These are established and continuously updated research areas too. Future studies could explore the role of managerial skills in the generational success of family businesses.

Within the sample, some studies concern managerial capabilities within public administration (PA) (e.g. local governments and health care services). Analysing Clusters 5 and 1, compared to the others, we can observe some divergences in the roles and competences required of managers in these two fields. While business managers must be performance-oriented and adapt quickly to changes, in public contexts, managers are more oriented towards managing transparency, regulations and accountability. Moreover, performance is not only measured in economic terms, but also through public service efficiency indicators. The biggest difference lies in the fact that human capital (i.e. people's skills, knowledge and abilities) is an essential resource in public administration, but personnel management is less dynamic than in the private sector. In the private sector, companies can hire and promote based on performance, they can manage bonuses and compensation, as well as evaluation mechanisms. In the PA, on the other hand, selection and promotion processes are often governed by rigid regulations, public competitions and formal criteria that make it more difficult to adapt to organisational needs, remuneration is standardised with fewer possibilities to customise compensation and incentives. Finally, in the private sphere, managers can fast adapt organisational strategies according to market changes. In the PA, bureaucracy and administrative procedures can slow down the adoption of new personnel management practices, making it more difficult to implement innovative strategies.

These differences between the two areas shed light on the fact that the topic of managerial capabilities has further gaps in the literature. Since there are not many studies dealing with the competences of PA managers, it would be interesting to conduct future research to investigate which managerial skills are most effective in improving public sector performance, how dynamic capabilities can be applied to PA to improve efficiency and innovation? As already highlighted for businesses, one could investigate how digitisation is changing the skills required of managers inside and outside PA.

In conclusion, this literature review aims to broaden the analysis of the theoretical frameworks used to study managerial capabilities, provide a critical and systematic interpretation of the main articles and suggest new research gaps to advance the topic from other different perspectives.

Research limitations. *The steps followed to select the articles and analyse them are based on the PRISMA protocol, which makes the replicability of the study possible. However, there are subjective selection criteria that constitute a limitation of the research. Even if systematic selection criteria are adopted, there is always the possibility of inclusion bias, whereby some relevant articles might be excluded due to the keywords chosen, the sources consulted, or the time limits imposed. Moreover, the categorisation of studies, the links between theories, and the conclusions also depend on the author's interpretation, again leading to a bias based on the writer's point of view. Furthermore, as these are rapidly evolving areas of research, the sample of studies may not include recently published studies.*

Managerial implications. *The insights provided by this literature review carry significant implications for managerial practice. By identifying the most critical managerial skills highlighted in recent research, the findings help managers and organizational leaders prioritize which competencies should be developed or reinforced to thrive in today's rapidly changing business environment. Specifically, managers can leverage these results to design targeted training, reskilling, and upskilling initiatives, ensuring that managerial development aligns with the strategic needs driven by digitalization, innovation, and market turbulence. Additionally, this review highlights the relationship between managerial capabilities and organizational context, underlining the importance of aligning individual managerial competencies with broader organizational governance and culture. Practically, this suggests managers and policymakers should foster environments that actively support managerial agility, adaptive decision-making, and innovation. Recognizing these competencies as dynamic rather than static allows organizations to better assess managerial potential, personalize leadership development initiatives, and increase organizational responsiveness to external disruptions and strategic opportunities.*

Originality of the paper. *This paper enhances the current literature on managerial capabilities by systematically integrating and synthesizing fragmented research streams into a comprehensive, structured, and coherent theoretical framework. Unlike previous literature reviews, which have predominantly focused on either dynamic capabilities or dynamic managerial capabilities in isolation, this study bridges these conceptual divides, providing a holistic understanding of how managerial competencies evolve and interact with organizational and environmental contexts. Methodologically, the adoption of advanced bibliometric techniques (VOS Viewer and Bibliometrix) offers a novel, data-driven approach to mapping the evolution of managerial capability research, clearly identifying influential studies,*

emerging themes, and knowledge gaps. Furthermore, the review broadens the scope of existing research by explicitly including both private and public sector contexts, highlighting sector-specific managerial competencies and illustrating how context significantly shapes managerial requirements. Thus, the originality of this study resides not only in its methodological rigor but also in its integrative perspective, comprehensive scope, and practical relevance, providing valuable guidance for future theoretical exploration and empirical investigation.

Key words: *dynamic managerial capabilities; managerial competences; managerial skills; managers; company managers; dynamic capabilities*

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Circular Economy Disclosure and ESG Performance: Measuring Impact Beyond Greenwashing

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Abstract

The increasing focus on environmental sustainability has led firms to adopt circular economy (CE) practices, yet concerns persist about their genuine impact versus greenwashing strategies. This study examines whether CE disclosure enhances ESG performance or serves as a mere reputational tool. Applying institutional theory, the research investigates the effects of energy efficiency, resource reduction, water efficiency, and emissions reduction disclosures on ESG scores. Additionally, the moderating role of external audits is analyzed to determine their influence on policy credibility and greenwashing mitigation. A quantitative empirical approach is employed, analyzing data from 921 European firms (2015-2024) sourced from Thomson Reuters, and Orbis. Multiple regression models assess the impact of CE disclosure, incorporating audit interactions. Results indicate that while CE disclosure generally improves ESG scores, energy efficiency and resource reduction disclosures have the strongest effects. Water efficiency and emissions reduction show weaker impacts. External audits, when considered alone, exhibit a negative relation with ESG scores, likely due to compliance constraints. However, their interaction with specific CE disclosures enhances ESG performance, reinforcing the credibility of sustainability commitments. The findings contribute to the greenwashing debate, highlighting the role of external audits in strengthening the effectiveness of CE disclosure. Implications for corporate governance, investment decisions, and regulatory frameworks emphasize the need for transparent and verifiable sustainability reporting.

Key words: *Circular economy; CE; ESG score; sustainability disclosure; external audit; greenwashing.*

Framing of the research. *In recent decades, the growing focus on environmental sustainability has prompted firms to reconsider their production and consumption models (Schroeder et al. 2019). Within this context, the circular economy (CE) has emerged as a key paradigm for reducing environmental impact by closing production loops through reuse, recycling, and waste reduction (Geisendorf and Pietrulla 2018). CE operates on three core principles: preserving natural capital, maximizing resource returns, and improving system efficiency (Ellen MacArthur Foundation 2015). It goes beyond the concept of sustainability by transforming production and consumption processes into circular systems designed to minimize emissions and reduce the depletion of natural resources (Geissdoerfer et al. 2017). The growing interest in this practice has raised concerns about the risk of greenwashing. Recent scandals (Chevron, ExxonMobil, Shell, etc..) have revealed that firms often misleadingly emphasise their environmental credentials without genuinely adopting sustainable practices. This not only undermines consumer trust but also hampers progress toward a truly sustainable ecological transition. Therefore, the question remains whether disclosure on circular economy adopted by firms has a tangible impact on their ESG score or if it primarily serves as marketing strategies aimed at enhancing corporate reputation without delivering substantial changes, i.e., greenwashing (De Freitas Netto et al. 2020). To analyze the relationship, the lens of institutional theory was adopted (DiMaggio and Powell 1983). Institutional theory views firms as actors operating within a social framework of norms, values, and imperatives that define acceptable behavior (Oliver 1997; Carpenter and Feroz 2001). Institutional pressure, in fact, encourages firms to respond to environmental issues (Dubey et al. 2015; Daddi et al. 2016). This theory has been widely employed as a theoretical framework to analyze firm strategies in response to climate change challenges (Greenwood et al. 2011; Alonso-Almeida et al. 2021).*

Purpose of the paper. *Although greenwashing as an academic topic is not entirely unexplored, the current body of research remains rather limited (Choudhury et al. 2024). This paper aims to address this research gap by examining whether circular economy disclosure communicated by firms has a measurable impact on their ESG score. Additionally, it explores the moderating role of external audits in enhancing the effectiveness of these practices.*

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This study focuses specifically on five key hypotheses. The first four hypotheses investigate whether there is a direct relation between circular economy disclosure (represented by energy efficiency disclosure, resource reduction disclosure, water efficiency disclosure and emission reduction disclosure) and ESG score. It assumes that adopting circular practices may positively contribute to improve ESG score but also considers the possibility that it might be employed as a greenwashing tool, yielding no concrete effects (Choudhury et al., 2024). Based on this we assume the following hypothesis:

H1: Energy efficiency disclosure has a positive effect on ESG score
H2: Resource reduction disclosure has a positive effect on firm ESG score
H3: Water efficiency disclosure has a positive effect on water consumption reduction performance
H4: Emission reduction disclosure has a positive effect on emission reduction performance

The relationship between circular economy disclosure communicated by firms and their ESG score is positively moderated by external audits, as independent verification enhances policy credibility and effectiveness. Audits reduce greenwashing risks by ensuring transparency and compliance, thereby strengthening stakeholder trust and reinforcing the alignment of corporate actions with sustainability commitments (Wijen 2014). Thus, we propose the following hypothesis.

H5: Extern audit committees as independent monitors moderate the relationship between circular economy disclosure and ESG performance

Methodology. *To address these research questions, we adopt an empirical quantitative approach based on the analysis of panel data collected from a sample of listed European firms that have publicly disclosed their adoption of circular economy policies (Greene, 2011; Wooldridge, 2019). One of the main methodological challenges in studying corporate disclosures and environmental performance is the potential issue of endogeneity, which arises due to reverse causality or omitted variable bias. To mitigate this concern, we lag all independent variables by one year, following best practices in corporate governance and sustainability research (Liang et al., 2013; Ashwin et al., 2015). The lag structure helps to establish a more plausible causal relationship between circular economy disclosure and environmental performance by ensuring that changes in the independent variables precede the observed outcomes.*

We employ a multiple regression model to analyze the impact of different types of circular economy disclosure on firms' environmental performance. Specifically, circular economy disclosure is operationalized through four key dimensions:Energy efficiency disclosure, Resource reduction disclosure, Water efficiency disclosure, and Emissions disclosure. Each of these variables captures distinct aspects of a firm's circular economy strategy and its commitment to sustainability.

Given the panel structure of the dataset, we considered both fixed effects (FE) and random effects (RE) models to control for unobserved heterogeneity (Greene, 2011; Wooldridge, 2019). To determine the most appropriate estimator, we conducted the Hausman test, which compares the consistency of fixed and random effects estimators (Greene, 2011; Wooldridge, 2019). The test results favored the random effects model, indicating that individual firm effects are uncorrelated with the independent variables and allowing for more efficient estimation (Greene, 2011). Random effects estimation is particularly suitable when analyzing datasets with large cross-sectional variation across firms and when the time dimension is relatively short (Wooldridge, 2019).

To analyze the relationship between circular economy disclosure and ESG performance, a multiple regression model was developed as follows, where circular economy disclosure is defined as energy efficiency disclosure, resource reduction disclosure, water efficiency disclosure and emissions disclosure:

Model 1: ESG score = f(Energy Efficiency disclosure + Control variables)
Model 3: ESG score = f(Resource Reduction disclosure + Control variables)
Model 5: ESG score = f(Water Efficiency disclosure + Control variables)
Model 7: ESG score = f(Emissions disclosure + Control variables)

To determine the influence of external audits, a model of interaction between circular economy disclosure and external audit was considered:

*Model 2: ESG score = f(Energy Efficiency disclosure*External Audit + Control variables)*
*Model 4: ESG score = f(Resource Reduction disclosure*External Audit + Control variables)*
*Model 6: ESG score = f(Water Efficiency disclosure*External Audit + Control variables)*
*Model 8: ESG score = f(Emissions disclosure*External Audit + Control variables)*

The research sample comprises 921 European firms observed over a ten-year period from 2015 to 2024, ensuring a broad and comprehensive dataset that captures longitudinal trends in corporate environmental performance and circular economy (CE) disclosure.

To construct the dataset, we integrated information from two well-established databases. Data on firms' circular economy disclosure and ESG performance were sourced from Thomson Reuters, a widely recognized provider of sustainability-related corporate information. This dataset ensures consistency in ESG reporting and allows for a detailed examination of how firms communicate their circular economy initiatives, such as energy efficiency, resource reduction, water efficiency, and emissions management.

Additionally, we supplemented the dataset with financial and firm-level information from the Orbis database, provided by Bureau Van Dijk. Orbis offers detailed financial statistics, ownership structures, and industry classifications, enabling a robust control for firm-specific characteristics such as size, profitability, and leverage.

The combination of these two databases ensures a comprehensive and reliable dataset, allowing for a nuanced analysis of the relationship between circular economy disclosure and environmental performance while accounting for financial and structural heterogeneity across firms.

Table 1 reports the sources and definitions of the dependent, independent and control variables.

Table 1 Variables definitions

Variable	Definition	Source
Dependent variables		
ESG Score	Measures a firm's environmental, social, and governance performance, providing an overall sustainability assessment.	Thomson Reuters
Independent variables		
CSR Sustainability External Audit	Dummy variable taking the value 1 if a firm undergoes an external audit for CSR sustainability, and 0 otherwise.	Thomson Reuters
Energy Efficiency disclosure	Dummy variable taking the value 1 if a firm has implemented energy efficiency policies, and 0 otherwise.	Thomson Reuters
Resource Reduction disclosure	Dummy variable taking the value 1 if a firm has policies aimed at reducing resource consumption, and 0 otherwise.	Thomson Reuters
Water Efficiency disclosure	Dummy variable taking the value 1 if a firm has water efficiency measures in place, and 0 otherwise.	Thomson Reuters
Emissions disclosure	Dummy variable taking the value 1 if a firm has an emissions reduction policy, and 0 otherwise.	Thomson Reuters
Control variables		
Age of the firm	Number of years since the firm was founded.	ORBIS
Board Size	Total number of directors on the firm's board.	ORBIS
Firm size	Total assets or revenue of the firm (measured in thousands).	ORBIS
ROA (Return on Assets)	Ratio of income to total assets, representing firm profitability.	ORBIS
Industry Variables	Dummy variables indicating the sector in which the firm operates (i.e., Accommodation, Administration, Agriculture, Arts, Construction, Electricity, Estate, Finance, Health, IT, Manufacturing, Mining quarrying, Servis, Professions, Public administration, Trade, Transportation).	ORBIS

Results. *To ensure the robustness of our analysis, we assessed variance inflation factors (VIF) to detect potential multicollinearity issues among the independent variables. Multicollinearity can distort regression estimates, making it critical to confirm that the explanatory variables are sufficiently independent. A commonly used threshold for concern is a VIF value exceeding 10 (Shrestha 2022), which would indicate significant multicollinearity. However, in our analysis, the average VIF value is 5.1, well below the critical threshold, suggesting that multicollinearity is not a major concern (Shrestha, 2022). This ensures that the estimated coefficients remain reliable and interpretable (Shrestha 2022).*

Table 2 provides a comprehensive summary of the descriptive statistics for the full sample. The ESG Score, our key dependent variable, exhibits a mean value of 60.302 and a standard deviation of 17.438, indicating a moderate degree of variability in firms' ESG performance. The ESG scores range from a minimum of 0.627 to a maximum of 95.747, reflecting substantial disparities among firms in terms of their sustainability practices. This wide dispersion suggests that while some firms have strong ESG performance and are proactive in sustainability initiatives, others demonstrate significantly weaker ESG engagement. The presence of firms with both exceptionally high and low ESG scores underscores the heterogeneity in corporate sustainability strategies across industries and countries.

Table 2 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ESG Score	8290	60.302	17.438	0.627	95.747
CSR Sustainability External Audit	8290	0.936	0.245	0	1
Energy Efficiency disclosure	8290	0.944	0.23	0	1
Resource Reduction disclosure	8290	0.981	0.137	0	1
Water Efficiency disclosure	8290	0.806	0.396	0	1
Emissions disclosure	8290	0.931	0.254	0	1
Age of the firm	8290	69.131	43.373	0	188
Board Size	8290	10.336	3.806	1	29
Firm size	8290	13815.207	37549.821	1	678825
ROA	8290	5.568	8.604	-97.397	76.416
Accommodation	8290	0.009	0.093	0	1
Administration	8290	0.009	0.093	0	1
Agriculture	8290	0.004	0.066	0	1
Arts	8290	0.008	0.087	0	1
Construction	8290	0.023	0.149	0	1
Electricity	8290	0.045	0.206	0	1
Estate	8290	0.049	0.216	0	1
Finance	8290	0.105	0.307	0	1
Health	8290	0.01	0.098	0	1
IT	8290	0.055	0.229	0	1
Manufacturing	8290	0.485	0.5	0	1
Mining quarrying	8290	0.047	0.211	0	1
Servis	8290	0.012	0.109	0	1
Professions	8290	0.03	0.172	0	1
Public administration	8290	0.004	0.066	0	1
Trade	8290	0.063	0.243	0	1
Transportation	8290	0.035	0.183	0	1

Table 3 provides the results.

Table 3 Regression results

VARIABLES	Model 1 ESG Score	Model 2 ESG Score	Model 3 ESG Score	Model 4 ESG Score	Model 5 ESG Score	Model 6 ESG Score	Model 7 ESG Score	Model 8 ESG Score
CSR Sustainability External Audit	-3.548***	-8.238***	-3.513***	-12.50***	-3.945***	-4.121***	-3.581***	-6.360***
	(0.657)	(1.445)	(0.664)	(2.028)	(0.687)	(1.244)	(0.670)	(1.928)
Energy Efficiency disclosure	7.108***	2.427*						
	(0.867)	(1.413)						
Energy Efficiency disclosure*CSR Sustainability External Audit		4.932***						
		(1.558)						
Resource Reduction disclosure			10.94***	2.256				
			(1.461)	(1.700)				
Resource Reduction disclosure*CSR Sustainability External Audit				9.198***				
				(2.111)				
Water Efficiency disclosure					3.058***	2.847**		
					(0.537)	(1.357)		
Water Efficiency disclosure *CSR Sustainability External Audit						0.232		
						(1.397)		
Emissions disclosure							6.891***	4.051**
							(0.668)	(1.883)
Emissions disclosure *CSR Sustainability External Audit								3.052
								(1.941)
Age of the firm	0.148***	0.148***	0.148***	0.148***	0.157***	0.157***	0.146***	0.146***
	(0.0123)	(0.0123)	(0.0124)	(0.0124)	(0.0126)	(0.0126)	(0.0123)	(0.0123)
Board Size	0.343***	0.343***	0.349***	0.347***	0.347***	0.347***	0.325***	0.324***
	(0.103)	(0.103)	(0.104)	(0.104)	(0.108)	(0.108)	(0.104)	(0.104)
Firm size	1.08e-05***	1.08e-05***	1.07e-05***	1.07e-05***	1.01e-05***	1.01e-05***	1.05e-05***	1.06e-05***
	(3.34e-06)	(3.33e-06)	(3.34e-06)	(3.34e-06)	(3.20e-06)	(3.20e-06)	(3.30e-06)	(3.34e-06)
ROA	-0.0222	-0.0225	-0.0174	-0.0173	-0.0176	-0.0176	-0.0171	-0.0173
	(0.0180)	(0.0180)	(0.0170)	(0.0170)	(0.0177)	(0.0177)	(0.0168)	(0.0169)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	48.88***	53.36***	44.70***	53.22***	53.22***	53.38***	49.18***	51.77***
	(3.542)	(3.652)	(3.846)	(3.903)	(3.834)	(3.956)	(3.654)	(4.051)
Observations	8,289	8,289	8,289	8,289	8,289	8,289	8,289	8,289
Number of firms	921	921	921	921	921	921	921	921

**** p<0.01, ** p<0.05, * p<0.1*

The coefficient for CSR Sustainability External Audit is negative and highly significant across all models, ranging from -3.548 (p<0.001) to -12.50 (p<0.001). This suggests that the presence of an external audit mechanism for CSR

sustainability may be associated with a lower ESG Score. This could indicate potential inefficiencies or rigidities introduced by external audits, which might limit the effectiveness of sustainability initiatives.

The Energy Efficiency disclosure variable has a positive and significant impact on ESG Score, with coefficients of 7.108 ($p<0.001$) and 2.427 ($p<0.05$), implying that energy efficiency disclosure contribute positively to ESG performance. Interestingly, its interaction with CSR Sustainability External Audit results in a positive and significant coefficient of 4.932 ($p<0.001$). This suggests that, although external audits alone have a negative impact, when combined with energy efficiency disclosure, they may enhance ESG performance, possibly by ensuring stricter compliance and effectiveness.

Similarly, the Resource Reduction disclosure has a strong positive effect, with coefficients of 10.94 ($p<0.001$) and 2.256 (not significant), reinforcing the idea that resource efficiency is beneficial for ESG outcomes. Notably, its interaction with CSR Sustainability External Audit produces a significant positive coefficient of 9.198 ($p<0.001$), suggesting that external audits might strengthen the effectiveness of resource reduction disclosure by enhancing transparency and accountability.

The Water Efficiency disclosure variable also shows a positive and significant impact on ESG performance, with coefficients of 3.058 ($p<0.001$) and 2.847 ($p<0.01$). However, its interaction with CSR Sustainability External Audit is not significant (0.232), indicating that external audits do not significantly alter the impact of water efficiency disclosure on ESG outcomes.

Lastly, the Emissions disclosure variable has a positive and significant effect on ESG Score, with coefficients of 6.891 ($p<0.001$) and 4.051 ($p<0.05$), confirming that firms with emissions disclosure tend to perform better in ESG metrics. However, its interaction with CSR Sustainability External Audit results in a non-significant coefficient of 3.052, suggesting that external audits do not substantially influence the effectiveness of emissions-related disclosure.

These findings highlight that CSR Sustainability External Audits alone tend to have a negative impact on ESG performance, potentially due to bureaucratic constraints or compliance burdens. However, when combined with specific sustainability disclosure, especially Energy Efficiency and Resource Reduction disclosure, they can enhance ESG outcomes. This suggests that external audits may be most effective when integrated with concrete sustainability measures rather than functioning as standalone mechanisms.

Research limitations. *This study offers valuable insights into the relationship between corporate circular economy disclosure, ESG scores, and external audits but has limitations. Causality cannot be firmly established due to its observational nature, as unobserved factors like industry dynamics or regulatory pressures may influence results. The role of external audits is context-dependent, varying by audit firm credibility, regulatory frameworks, and industry norms. Future research using experimental or longitudinal methods and broader samples could enhance causal inference and external validity.*

Managerial implications. *From a practical standpoint, this study offers valuable implications for firms, investors, and regulators, while also providing strategic insights for corporate leaders and decision-makers seeking to enhance sustainability performance.*

For firms, the findings emphasize the need to go beyond symbolic sustainability commitments and integrate circular economy initiatives into core business operations. This means that firms should not only disclose their sustainability efforts but also develop measurable strategies that align with ESG objectives, ensuring that circular economy adoption leads to concrete improvements in resource efficiency, emissions reduction, and environmental responsibility. By doing so, firms can strengthen their corporate reputation, mitigate regulatory risks, and build long-term stakeholder trust, which in turn fosters competitive advantages in a market increasingly focused on sustainability. Moreover, embedding independent audits as part of the corporate sustainability strategy can help firms differentiate themselves by demonstrating credible environmental responsibility, reducing accusations of greenwashing, and enhancing investor confidence.

The study underscores the broader managerial imperative of integrating ESG verification into corporate governance. By institutionalizing external oversight mechanisms, firms can foster a culture of accountability, drive continuous improvement, and ultimately position themselves as industry leaders in the transition toward a more sustainable economy. Managers should view external audits not as a regulatory burden but as a value-adding process that enhances transparency, credibility, and operational efficiency. Furthermore, this study suggests that firms should adopt internal performance metrics that align with ESG goals to proactively measure their progress on circular economy initiatives, allowing for data-driven decision-making and better alignment with stakeholder expectations.

For investors, the study provides a critical lens through which to evaluate corporate sustainability claims, enabling them to distinguish between genuine ESG commitment and superficial greenwashing. By integrating independent verification as a key criterion in investment evaluations, investors can make more informed capital allocation decisions, prioritizing firms that demonstrate tangible progress toward sustainability goals rather than merely issuing symbolic sustainability reports. This approach supports responsible investment strategies, such as ESG screening, impact investing, and engagement-based investment approaches, which are increasingly shaping global capital markets. Additionally, investors can use these findings to engage with firms and encourage stronger circular economy governance mechanisms, influencing corporate behavior through shareholder activism and engagement.

For policymakers and regulatory bodies, the research reinforces the necessity of robust sustainability reporting standards and the promotion of independent audits as a safeguard against misleading ESG disclosures. Given the growing risk of greenwashing, regulators should focus on enhancing transparency requirements, strengthening

verification mechanisms, and introducing mandatory sustainability audits for firms claiming circular economy adoption. Additionally, the study highlights the importance of harmonized ESG reporting frameworks, which would ensure that firms across different sectors and jurisdictions adhere to consistent, comparable sustainability metrics. Such regulatory interventions would not only protect investors from misleading ESG claims but also encourage firms to adopt genuine, performance-driven sustainability practices, thus reinforcing the role of circular economy disclosure as a mechanism for real environmental impact rather than a mere public relations tool.

By addressing these key areas, this study contributes to shaping corporate sustainability strategies, enhancing investor decision-making, and informing regulatory frameworks, ultimately supporting the broader transition to a more transparent, accountable, and sustainable economic system.

Originality of the paper. *While the adoption of circular economy disclosure has been widely discussed in sustainability and corporate governance literature, the originality of this study lies in addressing a key question that remains relatively unexplored, namely, whether such disclosures have a tangible impact on ESG scores or if they are primarily employed as greenwashing tools. Many firms publicly communicate their commitment to circular economy principles, yet the extent to which these disclosures translate into measurable environmental improvements remains unclear. This research aims to bridge this gap by providing empirical evidence on whether circular economy disclosures genuinely influence corporate ESG performance or if they are simply used to enhance corporate reputation without substantive operational changes.*

A further novel aspect of this study is the introduction of a moderating factor: the role of external audits. While prior research has explored the impact of disclosure on sustainability outcomes, few studies have investigated the role of external verification mechanisms in reinforcing or mitigating the effectiveness of circular economy commitments. By incorporating external audits as a moderating factor, this study examines whether independent verification processes enhance the credibility of CE disclosures and strengthen their link to ESG performance or, conversely, whether firms engage in disclosure practices regardless of third-party oversight.

Moreover, the multi-level analytical framework employed in this study represents a significant theoretical and empirical contribution. Rather than analyzing CE disclosure in isolation, this research explores the interaction between disclosure, external verification, and ESG performance, thus expanding our understanding of how external dynamics influence corporate environmental outcomes. By doing so, the study moves beyond the traditional debate on the effectiveness of sustainability disclosure and sheds light on the mechanisms that determine whether disclosure leads to substantive changes or remains superficial.

This research is particularly relevant in the context of increasing regulatory scrutiny on corporate sustainability claims. With stakeholders, investors, and policymakers demanding greater transparency and accountability, understanding whether firms' CE disclosures are trustworthy indicators of ESG performance or strategic communication tools is critical for shaping regulatory policies and corporate governance best practices. By addressing these pressing concerns, this study offers a timely and valuable contribution to the discourse on corporate sustainability, helping distinguish between genuine environmental commitments and symbolic sustainability rhetoric.

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Board gender diversity, spillover effects on managerial training and firm performance

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Abstract

This study provides the framework and the methodological premises for studying the relevance of board gender diversity in firms' decisions to engage in managerial training and the ultimate effect on firm performance. Results will be based on a unique, manually compiled panel dataset of 12234 listed and non-listed Italian firms observed from 2010 to 2018: we expect that having more women on the board enhances the likelihood that firms invest in managerial education, especially for women, and that this leads to higher performance in terms of productivity. The paper will contribute to the evidence that board diversity matters to firm value by influencing the decision-making process and the accumulation of managerial human capital.

Framing of the research. *Boardroom gender diversity has become an important policy focus in many countries. Initiatives ranging from mandatory gender quotas to voluntary targets and disclosure requirements have been implemented to increase the representation of women on corporate boards (ASX, 2009; Davies, 2011; Deloitte, 2011). The underlying rationale is that greater gender diversity in the boardroom could have significant effects on corporate governance and firm performance. More specifically, there are three main arguments for positive effects of board gender diversity. The first one relates to creating equal opportunities for men and women within the organization. The second one relates to firm performance: drawing board appointments from a larger pool including all genders creates the conditions to improve results through increasing the chances to attain a higher degree of board independence (Carter et al., 2003) and higher board effectiveness (Nielsen and Huse, 2010) through a stricter monitoring on CEOs and higher meeting attendance (Adams and Ferreira, 2009). The third argument in favor of board diversity relates to the spillover effects it creates, that is the expectations that more women on the ultimate level of decision-making at the firm increases gender equality at the other levels.*

The empirical analysis of the effect of board diversity on firm performance is challenged by endogeneity concerns, as better performing firms may be more likely to appoint female directors. This methodological issue may be overcome by exploiting the institutional interventions that created discontinuity in the female representation in board directors. For example, Ferrari et al. (2022) take advantage of the staggered implementation of the Italian quota law, introduced in 2011, to investigate the effect on board composition and firm operating and financial performance in listed companies observed from 2007 to 2014. Results suggest that quota changed the selection process for the entire board, since boards with more women show higher average education levels and fewer older members. In addition, greater female board representation reduces stock price volatility and have no significant negative impact on firms' operating and financial performance.

Another way to mitigate the endogeneity issue, which would limit the ability of empirical studies to establish a causal relationship between board diversity and firm performance, is to focus the analysis on the specific actions taken by the board (Adams et al., 2010). Indeed, one important channel through which board gender diversity may influence firm performance is its impact on the board's decision-making.

In this study, we examine a specific spillover effect: firms' investment in managerial training. We investigate whether more diverse boards of directors are more likely to invest in accumulating C-suite intellectual capital and whether they do so differently for female and male managers. Since board diversity reflects potential differences in decision-making tendencies across boards with varying gender compositions, particularly regarding decisions that may affect gender disparities within the firm, a more gender-diverse board may be more inclined to prioritize investments in employee training and development. This accumulation of human capital could serve as a key driver of firm productivity and long-term performance. Supporting this argument, Tate and Yang (2011) find that an important externality of female corporate leadership is improved workplace conditions and greater training opportunities for women throughout the firm. Flabbi

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et al. (2019) attest a positive gender spillover effect of Italian board quotas on earnings for managers at higher levels in the firm, but negative effects for lower levels. von Essen and Smith (2024) explore the effect of board diversity in the reduction of compensation or representation gaps and conclude that both the "quantity", i.e. the number or share of female board members, and the "quality" of them, i.e. their power and network, matter, and the quality spillover effects seem to dominate over quantity. If having a woman on the board (or at the limit, only one woman) becomes merely symbolic, with limited power, no significant effect on firm performance or governance is expected. This suggests that a critical mass of women is necessary to influence board decisions (Kanter, 1977). Conversely, the absence of positive effects, or even the presence of negative effects, resulting from increased female representation on boards may be attributed to the 'queen bee' phenomenon, where some women in leadership positions may be reluctant to support or may even hinder the advancement of other women (Derks et al., 2016). The board quality may be interpreted as the power to influence board decisions, then built through (and proxied by) the directors' experience and connections. In addition, a female chairman is surely important for the decisions that may affect the executives gender equality.

Purpose of the paper. *This study aims to analyze both the spillover effects of board diversity on investment in managerial human capital and the factors that may confound the relationship between board diversity and firm performance. By doing so, we contribute to the literature on the spillover effects of board diversity by examining the impact of female representation on boards of directors on firms' decisions to invest in managerial training for women versus men. Additionally, we seek to provide meaningful evidence on the impact of board gender diversity on firm performance. Specifically, we investigate whether the appointment of female directors influences firms' propensity to invest in management training, particularly for female managers, and whether these human capital investments ultimately lead to improved firm productivity. While previous research has explored the effects of board diversity on corporate governance, decision-making, and financial performance, relatively little attention has been devoted to understanding how board composition affects long-term investments in workforce development. Managerial training is a critical driver of leadership progression, and investigating its allocation across gender lines provides valuable insights into the extent to which diverse boards actively contribute to reducing gender disparities in career advancement. Our study seeks to fill this gap by examining whether board diversity influences not only the quantity of investment in managerial training but also its distribution between male and female managers. Furthermore, this study acknowledges that the impact of board gender diversity on human capital investments may depend on multiple underlying factors. In particular, we consider whether the quality of female board members, measured in terms of their professional experience, leadership roles, and network influence, plays a moderating role in shaping firms' training decisions. This perspective aligns with prior research suggesting that not all women on boards wield the same level of influence, and that the power and connectivity of female directors can significantly affect their ability to drive organizational change. By focusing on both listed and non-listed firms, we also provide a broader perspective on how board diversity influences managerial training investments across different corporate structures. Listed firms are subject to stronger regulatory pressures and public scrutiny, whereas non-listed firms may have greater flexibility in governance choices, potentially leading to different dynamics in how board diversity translates into training decisions. Our dataset allows us to explore these variations, offering a nuanced understanding of how institutional factors shape the relationship between board composition and human capital development and firm performance. Ultimately, this study contributes to the broader policy debate on gender quotas and board diversity regulations by assessing whether increasing the number of women on boards translates into meaningful career development opportunities for female managers, rather than serving as a symbolic compliance measure. Our findings are expected to provide empirical evidence on whether board diversity policies contribute to long-term improvements in firm productivity by fostering investments in managerial skills and leadership development.*

Methodology. *The empirical analysis is based on a nine-year unique panel dataset, created by merging three complementary datasets, the one including information on board of directors, another one containing information on managerial training and the last one with data on firm accounting information. The first dataset was manually compiled by retrieving the relevant data from the Italian section of the Bureau van Dijk database. This includes the full personal details of directors and their charge in the board. The directors' gender has been verified, amended if needed, and added, when missing, by cross-checking the first names with several repositories of names in several languages. The directors' age has been derived from their date of birth and the tenure from the presence in the board over the longest period for which directors' personal details are available in the Bureau van Dijk dataset, that is since 2000. The dataset referred to the firm investment in managerial education includes information provided by Fondirigenti, an Italian interprofessional fund established in 2004 to finance such educational activities to the senior management of firms adhering to the Fondirigenti fund itself. The dataset includes the number of managers in training, days spent on training, total hours, and overall training expenditure of a sample of such firms, that are Italian listed and non-listed companies active in several industrial sectors and adhering to the Fondirigenti fund. All information is detailed for male and female managers. The third dataset provides firms' accounting data, enabling the construction of firm-level indicators, such as sector of activity, sales, value-added, fixed capital stock, number of employees, labor costs, and other financial variables. This matching process yields a robust firm-level panel dataset covering 9 years from 2010 to 2018, consisting of 12234 firms, with reliable and comprehensive information on board of directors and senior management training practices.*

Following Tokarchuk and Gabriele (2023), the production technology assumed in this analysis is Cobb–Douglas (Levinshon and Petrin, 2003):

$$y_t = \beta_0 + \beta_l l_t + \beta_k k_t + \beta_m m_t + w_t + \eta_t \qquad [1]$$

where y_t is the logarithm of the firm's output (value-added) in year t, l_t and m_t are the logarithms of the labor and of the intermediate input, respectively, k_t is the logarithm of capital. The error has two components: the transmitted productivity, given by w_t, and an error term, η_t, which is assumed uncorrelated with the inputs.

The effect of board gender diversity on managerial training and on firm performance is investigated through a two-step regression analysis. First, we estimate the effect of board characteristics, and in particular of board diversity, on firm investment in training male, female or all managers. In the second step, we regress firm TFP obtained using [1] on the firm training investment and the relevant board characteristics: this analysis concerns "active" firms only, that is firms that actually decide to invest in managerial training. The second step of analysis consists in the estimation of the following model:

$$\ln(TFP_{i,t}) = \beta_0 + \beta_1 \ln(TrPC_{i,t-1}) + \beta_2 BoardCharacteristics_{i,t-1} + \beta_3 X_{i,t-1} + IMR_{i,t-1} + \tau_t + \varepsilon_{i,t} \qquad [2]$$

The variable $TFP_{i,t}$ represents the productivity of the given firm in a given year. The variable $TrPC$ represents the overall number of training hours used by firm i in year t for all senior managers in the firm or, alternatively, the share or the level of training hours devoted to female managers; $BoardCharacteristics_{i,t-1}$ is a vector of variables related to board composition and characteristics, $X_{i,t-1}$ is a vector of independent covariates: firm size, age, sector of activity (SIC two-digit level), and the geographical area of activity at NUTS 1 level. To control for the impact of business cycles, the variable τ_t is included as a time dummy. The variable $IMR_{i,t-1}$ is the inverse Mills ratio, calculated based on [1] and included in the instrumental variable regression model to address potential selection bias. Board characteristics relate to the firm's governance mechanisms and to both the "quantity" and the "quality" of directors; they are captured by variables measuring board size, the directors' mean age, their tenure, whether they are executive or not, the number of female directors, whether there is only one female director or more, the share of female directors, duality, female duality, female CEO and female chairman.

The estimation of Equation [2] employs IV techniques to account for the potential endogeneity of the training variables, since more productive firms may engage in more training activities thanks to greater resource availability, or a better understanding of the value derived from manager training. The external instrument chosen is the annual funds made available to each firm by Fondirigenti and earmarked for senior manager training (variable "Credit"). This funding is generated through administrative regulations tied to the firm membership to Fondirigenti. Specifically, Fondirigenti sets aside a portion of the annual fee owed by firms —0.30% of total yearly senior managers' wages— in a dedicated fund, accessible solely for investment in senior managers training. This fund expires after three years, after which the firm loses access to it, and Fondirigenti reallocates the funds for other purposes. The variable "Credit" exhibits a significant correlation with yearly training hours and expenditure and its correlation with TFP is negligible. Consequently, the number of training hours and expenditure are contingent on the annual training budget allocated to each firm, which, ex ante, correlates with training hours but not with firm performance. To mitigate the potential simultaneity bias, all independent variables are lagged by one period with respect to the dependent variable. Additionally, robust standard errors are computed, to address heteroskedasticity. In both steps of the analysis, we adopt the approach of Ferrari et al. (2022) for the sub-sample of listed firms to identify the effect of gender quotas (and board characteristics) on firms' training decisions and performance. Although the quotas apply to listed (and state-owned) firms only, we repeat the exercise for the entire sample, assuming that the policy also increased non-listed firms' awareness of the importance of board diversity.

Results. *To date, the results remain preliminary and are primarily descriptive and exploratory in nature. "Active" firms, i.e. firms that invest in any training activity for managers during the sample period, represent about 30 percent of the sample. Small firms, with fewer than fifty employees, constitute 48 percent of the total sample, while medium and large firms (more than fifty employees) make up around 91 percent of the firms using training services. Most firms (about 77 percent) are located in North Italy, and around 78 percent have been in business for over 14 years. The sample is predominantly (almost 70 percent) composed of firms operating in the manufacturing sector. We anticipate that simply increasing the number of women on the board of directors will have little or no immediate impact on firms' decisions to invest in them in the short term, and thus on firm performance. However, we expect a more significant effect in the long run, particularly when female representation on the board reaches a certain threshold. As in Tokarchuk and Gabriele (2023), we expect a positive effect of senior management training on firm productivity, an effect that is even stronger when female managers participate in such training activities.*

Research limitations. *Although the substantial dimension of the final dataset guarantees the validity of the explorative investigation proposed in the work, the sample size is constrained by the number of firms for which Fondirigenti provides information on training hours and investment.*

The dataset contains the information of training hours possibly provided by each firm to male and female managers: as such, it allows for a comparison of the effect of board gender diversity between firms that utilized the training opportunities offered by their association with Fondirigenti and those that did not invest in managerial training despite

the availability of dedicated funds. Yet the information on the total number of female and male managers at firm level is missing and this limitation makes it impossible to evaluate whether the possible lack of involvement of female managers is due to the absence of female senior managers in the firm.

Future research may include in the analysis a measure of directors' power measured in terms of interlocking and their previous experience as directors or executives in other firms.

Managerial implications. *This study contributes to the discussion on what factors increase women's professional development in firms. If confirmed, the results suggest that the positive effect of female board representation on female managerial training and firm performance implies that quota regulations, such as the 2026 EU regulation requiring 40% women on the boards of the largest companies, can influence the organization's gender gap through changes in the firm's decision-making processes and may ultimately improve firm performance. Also, board gender diversity may be a way to change firm culture and gender norms, by inducing firms to invest in women's human capital. Additionally, board gender diversity may serve as a catalyst for cultural and structural transformation, inducing firms to invest in women's human capital and fostering a more inclusive leadership pipeline. The presence of strong female networks within firms may further enhance these effects, as women directors with well-established professional ties can facilitate the promotion of female executives. However, as prior research suggests, the magnitude of these spillovers may remain limited unless broader organizational and societal factors, such as retention policies for women in senior roles and work-life balance considerations, are also addressed. Finally, this research stems from an important collaboration between academia and external stakeholders, a prerequisite for scientific inquiry to amplify its real-world impact. By analyzing firms that actively engage in managerial training initiatives, we provide practical insights for policymakers and business leaders seeking to design interventions that go beyond quotas and create sustainable pathways for female career progression in both listed and unlisted firms.*

Originality of the paper. *Italy provides an interesting setting to study the impact of board gender diversity on firms' decisions to invest in managerial training and the subsequent effects on firm performance, particularly given the introduction of a gender quota law for boards of listed companies in 2011. Furthermore, Italy ranks poorly on gender equality indices, making the quota, seen as a necessary intervention to accelerate progress, a highly relevant issue in the national debate. This study adds to the literature by exploring how and when female board members contribute to gender-progressive spillovers within firms. While previous research has primarily focused on the representation effect of women on boards, our work delves deeper into the mechanisms through which board diversity influences managerial training investments. Specifically, we investigate whether the presence of female directors translates into targeted human capital investments for female managers and whether these investments yield productivity gains for firms. Furthermore, our study acknowledges that not all women on boards have equal influence. We extend the discussion by considering the role of director power in driving spillover effects, thereby contributing to the broader debate on the importance of quality over quantity in board diversity policies. The uniqueness of the data on managerial training investments, provided by Fondirigenti, ensures the originality of the results. By leveraging a diverse sample of firms, including both listed and non-listed companies, over an extended period, this study provides robust empirical evidence on the long-term organizational impact of board gender diversity. Additionally, our findings offer valuable insights into the conditions under which quota regulations can lead to meaningful changes in firm culture, gender norms, and leadership structures.*

Keywords*: board of directors; gender quotas; managerial training; firm performance; productivity*

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Track 12
Supply Chain Management, Logistics & Operations

Fostering humanitarian supply chain towards positive environmental sustainability impact. Insights from experiences in logistics operations

ALESSANDRA COZZOLINO[1]

Abstract

The paper highlights the emerging issue concerning range and variety of challenges to implement solutions that offer positive environmentally sustainable impact in humanitarian logistics - HL. While HL inherently contribute to social sustainability by alleviating the suffering of those in need, and its economic effort is under continuous attention, its unintended adverse environmental impact has been overlooked to date. The immediate response to disasters, for example, while well intended, sometimes causes avoidable humanitarian challenges later on: drinking water may be essential, but it is not necessary to provide it in small plastic bottles; injections may save lives, but inappropriately discarded syringes are hazardous. The present work aims at focusing on real world impact research to solve practical problems and combining theoretical improvements in the discipline. A structured literature review on the topic is combined with actual case studies and experiences in the logistics operations.

Framing of the research. *Since the growing attention on climate change and sustainability bringing Environmental, Social & Governance - ESG accountability to global supply chains, this paper aims to underline the potential that Humanitarian Logistics - HL has toward sustainability in the Triple Bottom Line - TBL (economic, social and environmental) direction, with a specific focus on greening the humanitarian supply chain.*

The specific context of analysis is the HL, responding to the urgent call for more humanitarian research to address emerging challenges in a complex world (World Economic Forum, 2024). This is also noted very recently by the Director of the Harvard Humanitarian Initiative (2024). According to the report of the Office for the Coordination of Humanitarian Affairs - OCHA, COVID-19, the climate crisis, conflicts and catastrophes are major factors that increased humanitarian needs in 2022, leading to 274 million people needing humanitarian assistance and defining the importance of HL activities (Fan et al., 2023). In the past decade, humanitarian crises have escalated in both frequency and intensity - ranging from climate change-induced disasters to protracted conflicts and pandemics: over 299 million people needed humanitarian assistance and protection in 2024, marking a staggering increase from previous years. In 2025, 305 million people around the world will require urgent humanitarian assistance and protection, as multiple crises escalate with devastating consequences for the people affected by them (OCHA, 2024). In an era marked by unprecedented global challenges, supply chain dynamics within the humanitarian context are more impactful than ever, as HL is pivotal for delivering vital aid to those impacted by crises, according to the last report by the Center for Humanitarian Logistics and Regional Development - CHORD (2025).

HL is a relatively new research area that has grown steadily (Kembro et al., 2024; Altay et al., 2021). It considers people, resources, knowledge, and activities involved in planning, implementing, and controlling efficient and effective flows and storage of materials from the points of origin to the place where they are needed when a disaster or an emergency occurs, with the mission of saving lives and alleviating the suffering of affected populations (Van Wassenhove, 2006; Thomas and Fritz, 2006; Kovács & Spens, 2007; Tomasini & Van Wassenhove, 2009; Christopher & Tatham, 2011; Cozzolino, 2012; Kovács et al., 2017; Cozzolino, 2021; Altay et al., 2021)

Purpose of the paper. *While HL inherently contribute to social sustainability by alleviating the suffering of those in need, and its economic effort is under continuous attention, its unintended adverse environmental impact has been overlooked to date (Zarei et al., 2019).*

Key stakeholders rightfully highlight the need to delicately balance environmental consciousness, and the overarching objective of providing sustained, reliable aid to the maximum number of people during crises. To meet this pressing need to better embed scalable, environmentally sensitive delivery solutions, while still empowering humanitarian practitioners to save lives, the sector has looked to pursue a systematic, targeted approach to more climate-friendly humanitarian efforts. There are three definitive areas to be managed from logistics' activities: decarbonisation of equipment and transport, green procurement, and mitigation of the waste generated by operations. For example, the United Nations Logistics Cluster coordinates the "Waste management and measuring, Reverse logistics, Environmentally sustainable procurement and transport, and Circular economy" (WREC) project, alongside a coalition of humanitarian organisations, to offer awareness building, practical guidance, and real time environmental expertise to help the sector expand its "do-no-harm" mandate to the natural environment (Logistics Cluster, 2022).

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A new challenge that has emerged in the academic literature is then greening the humanitarian supply chain - HSC (Kovács and Spens, 2009). The immediate response to disasters, while well intended, sometimes causes avoidable humanitarian challenges later on: drinking water may be essential, but it is not necessary to provide it in small plastic bottles; injections may save lives, but inappropriately discarded syringes are hazardous (Corbett et al., 2022). Moreover, climate change has a great impact on humanitarian assistance, and humanitarian assistance, especially logistics support, is expected to grow substantially due to climate change (Kovács and Spens, 2009).

The need to consider green supply chain principles and practices in the relief supply chain is growing its evidence (Sarkis et al., 2013, 2012). Only some studies have beginning to address this question, e.g., Kovács (2011), Abrahamas (2014), Haavisto and Kovács (2014), Kunz and Gold (2015), Jilani et al. (2018). Other studies on green HSCs have focused on only one specific area, such as product design or procurement for examples, leaving a holistic view to future research (Zarei et al., 2019). More recent contributions are specifically on barriers to sustainability in HSC (Bag et al, 2022)

Although the topic of this paper is highly crucial and holds a central position in the actual debate, limited research has been conducted on this specific aspect, and the literature remains highly fragmented. According to these considerations, then the aim of this research is the following:

RQ1 - What concrete initiatives can be implemented to greening the humanitarian supply chain?

RQ2 - How they can be organized?

To pursue the objectives of this study, the research combines a literature review with an explorative empirical investigation to identify concrete initiatives of greening the humanitarian supply chain within the HL context. This approach is useful for better understanding this real-world phenomenon not only theoretically but also from the perspectives of practical initiatives and implementations. Additionally, the paper proposes an initial conceptual framework that want to capture the key elements of greening the humanitarian supply chain and lays a foundation for future inquiries that can accelerate progress in advancing knowledge in this topic.

Methodology. *The research combines a literature review with an explorative qualitative empirical investigation.*

In the search for experiences and empirical cases, for the empirical part, the following sources were selected: secondary sources, i.e. academic publications related to previously carried out studies; documentary analysis, i.e. internal reports of humanitarian organizations and private companies, conference proceedings, press releases, etcetera; participation in academic and corporate webinars. 31 short desk cases have been analyzed from 2007 to now, in different countries and different areas of implementation (transport, packaging, procurement, etcetera).

Results.

Literature review

Research definitions

In business management literature, the most widely quoted definition of sustainability is by the Brundtland Report (1987) where it is defined as the development that meets the need of the present without compromising the ability of future generations to meet their own needs. Elkington's Cannibals with Forks: The Triple Bottom Line of 21st Century Business (1997) offers an inspiring metaphor that challenges contemporary corporations to simultaneously deliver the triple bottom line (TBL) of economic prosperity, environmental quality and social equity.

Christopher (1992), among others authors, defines "supply chain" as a network of organizations involved, through upstream (supply) and downstream (distribution) relationships, in the various processes that give value to products and services offered to the final consumer, and "supply chain management" as the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole.

Considering that twenty-first century organizations have pressured by different stakeholders to incorporate sustainability goals into the management of their supply chains, Seuring and Müller (2008) defined "sustainable supply chain management" as the management of materials, information and capital flows as well as cooperation among companies along the supply chain while integrating goals from all three dimensions of sustainable development—economic, social and environmental, which are derived from customer and stakeholder requirements.

By extension and drawing from Christopher's (1992) definition of a supply chain, an "humanitarian supply chain" is defined as the network of organizations that are involved in the design, management and coordination of the different processes and activities that include preparedness, planning, procurement, storage, transportation and distribution of emergency goods and services from the point of origin to the point of consumption, with the purpose of alleviating the suffering of people and communities affected by disasters whether they are natural or man-made (Laguna-Salvadó et al., 2019). And a "sustainable humanitarian supply chain" - SHSC combines the two concepts together.

Research gaps

Cao et al. (2018) observed that, contrary to what can be said of commercial supply chains, sustainability in the disaster context, being in its early stage, is considered by just a few researchers. In a recent literature review, Dubey and Gunasekaran (2016) also observed that there are relatively few contributions which focus on SHSCs. Therefore, the SHSC concept is still far from attaining maturity. One of the recent attempts comes from Klumpp et al. (2015) who proposed a

definition for "sustainable humanitarian operations" built on a combination of humanitarian operations' objectives, logistics definition (from the CSCMP) and the Brundtland sustainable development definition: "sustainable humanitarian logistics has the objective to assure every human being—especially in situations of disasters and emergencies—a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services by planning, implementing, and controlling the efficient, effective forward and reverse flow and storage of goods, services and related information throughout the whole SC in a manner that meets the needs of the present without compromising the ability of future generations to meet their own needs".

Laguna-Salvadó et al. (2017) developed a conceptual performance framework for the sustainability of HSC operations based on the TBL model and taking inspiration from the "house of sustainable supply chain management" by Teuteberg and Wittstruck (2010): this model has been called the "house of sustainable humanitarian supply chain operations", and it is an attempt to design a framework that includes the economic, social and environmental dimensions of sustainability, and that can be used for studying the performance of SHSCs. It proposes a set of performance measures classified on the TBL performance dimensions that should be considered for SHSC decision-making, covering the HSC main processes, i.e. source, make and deliver (Laguna-Salvadó et al., 2019).

Corbett et al. (2022) identified five areas in Sustainable humanitarian operations: material convergence, coordination between humanitarian organizations (HOs), logistics, partnerships with industry, and health. The discussions demonstrate the possibility of better integrating sustainability with humanitarian operations despite the inherent tension between the immediate need to save lives and the longer-term perspective associated with sustainability. This requires that various stakeholders think differently about the balance between short-term and long-term interventions, the metrics and incentives they apply, and the role of local versus global organizations.

*Other studies have been developed literature review on sustainable humanitarian supply chain management themes (*Anjomshoae *et al., 2023; Nawazish et al., 2023) or proposing a framework on it (Kunz & Gold, 2015; Haavisto & Kovács, 2014). Some authors use the term "Circular" humanitarian supply chain for disaster response (Baharmand, 2024).*

In this paper, we are going to focus on the environmental aspect so that the terms "sustainable supply chain" (SSC) and "green supply chain" (GSC) even if are sometimes used interchangeably and ambiguously are not the same, and in this case the focus is on greening the HSC. In fact, the term "green" should be restricted to the environmental dimension of sustainability, while the term "sustainability" should be used when studying the three dimensions. Our argument is in line with Ashby et al. (2012) who established that SSC management is an extension of GSC management since the latter only considers the environmental aspect of a sustainable business.

The environmental dimension in the "house of sustainable HSC operations" is composed of two main measures (Laguna-Salvadó et al., 2017): pollution reduction and resource conservation. The material flow processes have a direct impact on both measures. The aim of pollution reduction is to decrease the emission of harmful or poisonous substances such as CO2 into the atmosphere, mainly depending on the choice of transportation modes and distances between suppliers and beneficiaries. Resource conservation is about the reasonable use and protection of valuable resources such as trees, minerals, wildlife and water, with respect to the choice of packaging materials, handling processes or recovery policies.

The most recent contributions (Altay et al., 2023; Merdivenci et al, 2023; Nawazish et al., 2023; Tuomala et al., 2022; Fuli et al., 2020; Jilani et al., 2018; Abrahams, 2014) report that there are, in particular, some real strategies whose implementation is aimed solely at reducing the environmental impact of the humanitarian supply chain and they can be summarize in the following ones:

1) *Transport optimization: use of low-emission vehicles, optimization of routes to reduce fuel consumption and CO2 emissions;*
2) *Eco-friendly packaging: replace single-use plastic packaging with recyclable biodegradable materials;*
3) *Responsible waste management: implement recycling and safe waste disposal practices in the intervention areas (recycling of materials used for relief to the safe management of medical waste, to avoid environmental contamination);*
4) *Sustainable procurement: prefer the procurement of goods from local suppliers who adopt sustainable practices, this reduces the environmental impact related to transportation over a distance and on the portal local economies, reduce the need for large storages by reducing waste;*
5) *Use of renewable energy: implement the use of renewable energy sources (solar panels), to power logistics operations and rescue centers in order to limit polluting emissions.*

Following these strategies specifically related to logistics operations the empirical part has been developed.

Insights from experiences and cases

The results of the empirical part will be presented during the Conference.

Research limitations. *In this version of the research the main limitation arises from a solely desk analysis; the 31 cases are very short in their description an without a quantification of their impacts. The next step should be integrating*

with on field study with interviews to the actors who proposed, implemented and beneficed of the sustainable initiatives investigated.

Managerial implications. *The study can be useful for professionals and managers from both the humanitarian and commercial sectors, since working together in HL can benefit humanitarian organizations and companies, especially in complex efforts, where the relief operation can make the difference between death and life. Also, because humanitarian operations and logistics are big business and, unfortunately, disaster relief is, and will continue to be, a growth market.*

Originality of the paper. *Although the topic of this paper is highly crucial and holds a central position in the actual debate, limited research has been conducted in this specific area and the literature remains fragmented. This study can be useful in academia because, given the increased research interest in HL and in greening the supply chain, a clear focus on what concrete initiatives can be implemented to greening the humanitarian supply chain (RQ1) and how they can be organized (RQ2) is important for the development of a theoretical framework inside the discipline.*

Key words: *humanitarian logistics; humanitarian supply chain; environmental sustainability; green; logistics operations.*

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Green Logistics Practices Driving Buyer Decision-Making: A Study on Logistics Service Provider Selection

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Abstract

The logistics and transport sector generates over a third of global CO2 emissions, significantly contributing to a company's Scope 3 emissions. As regulatory targets become increasingly demanding, the selection of logistics service providers plays a crucial role for logistics buyers attempting to meet sustainability goals. In response, logistics service providers have been implementing a variety of green logistics practices to reduce their impact on the natural environment. The research aims to determine the most important green logistics practices influencing logistics buyers' decisions in the context of logistics service providers' selection. Grounded in behavioral decision theory, we test our hypotheses by conducting a series of scenario-based experiments with logistics and supply chain managers as respondents. The findings of this research aim at providing timely and practical guidance for managers at logistics service provider firms seeking to align their sustainability initiatives with buyer expectations.

Framing of the research. *Environmental sustainability and greenhouse gas (GHG) emissions receive significant attention at the managerial and regulatory levels due to their connection to climate change. The saliency of global warming and reduction of greenhouse gas emissions is supported by visible actions such as the Paris Climate Agreement - which focuses on the adoption and financing of GHG emissions mitigation (United Nations, 2020) - and the growing number of companies committing to Science Based Targets for emissions reduction (Science Based Targets, 2021). Moreover, recent regulations such as the European Corporate Sustainability Reporting Directive (European Commission, 2025), require an increasing number of companies to report not only direct GHG emissions (i.e., Scope 1 emissions) (Greenhouse Gas Protocol, 2024) but also indirect emissions happening in their supply chains (i.e., Scope 2 and Scope 3 emissions). Such requirements prompt companies to establish emission reduction strategies beyond their four walls (De Stefano & Montes-Sancho, 2024; Hettler & Graf-Vlachy, 2024; Villena & Dhanorkar, 2020), placing outsourced logistics practices under the spotlight.*

In this context, companies' selection of more environmentally-sustainable logistics service providers (LSPs) has a key role to play in meeting the demanding targets now established by legislators and policymakers. The logistics and transport sector represents the largest-emitting sector in numerous developed countries, generates over a third of global CO_2 emissions (Huge-Brodin et al., 2020; ISO, 2025), and is forecasted to keep growing. In addition, these activities largely contribute to a company's Scope 3 emissions. Against this backdrop, broadening LSPs' selection criteria to include their environmental impact is a big managerial concern, at least within logistics and supply chain functions. On their side, LSPs have been developing a variety of logistics-related initiatives to reduce their impact on the natural environment, broadly referred to as "green logistics practices" (GLPs) (Evangelista et al., 2017; Prataviera et al., 2023).

Extant research has highlighted a mismatch between LSPs' green offering and logistics buyers' green demands (Martinsen & Huge-Brodin, 2014; Huge-Brodin et al., 2020; Jazairy & Von Haartman, 2020). This misalignment slows the actual adoption of GLPs and consequently hinders the progress in mitigating the environmental impact of logistics and transport activities. Moreover, while previous research showed that environmental performance acts as a differentiator in supplier selection decisions (Davis-Sramek et al., 2020; Thomas et al., 2016), research concerning LSPs largely treats GLPs as a singular entity, failing to establish focused inquiries for each GLP (Jazairy & Von Haartman, 2020). Understanding logistics and supply chain managers' decision-making in their selection of LSPs when incorporating environmental criteria still represents a gap. This gap is further exacerbated by the lack of clear environmental performance metrics (Canal Vieira et al., 2024; Miemczyk et al., 2012) that managers could rationally evaluate and compare against a long-established set of criteria (i.e., cost, service, capability) (Davis-Sramek et al., 2018; Meixell & Norbis 2008).

Therefore, the present study aims at understanding which intra-organizational and inter-organizational GLPs influence a logistics buyer's selection when outsourcing logistics and transport activities to different possible LSPs. To ensure considering a comprehensive categorization of GLPs, we leverage previous contributions (e.g. Centobelli et al., 2017; Colicchia et al., 2013) and rely particularly on the work by Prataviera et al. (2023). Our study aims at answering

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the following research question: "which GLP or combination of GLPs is most important in LSPs selection?". We turn to behavioral decision theory (BDT) to understand how managers evaluate practices in sustainable LSP selection for decision-making.

Purpose of the paper. *The purpose of this research is to determine which GLPs are most important for LSPs selection decisions. To do so, rather than relying on prescriptive frameworks, this research utilizes a theory-based empirical approach to determine managers' decision-making in an outsourcing logistics and transport selection context. Insights from BDT inform the development of hypotheses that predict a relationship between the implementation of specific GLPs by LSPs and the purchase intentions of a logistics buyer.*

Logistics service providers selection and sustainable offerings. *Green supply chain management refers to the integration of environmental concerns within supply chain management (Carter & Rogers, 2008; Seuring & Müller, 2008), with the aim to reduce the negative environmental impact of supply chain activities. As logistics determines a great share of companies' carbon footprint, in the past decade, green logistics has gained momentum, and a variety of GLPs have been adopted and implemented in practice. Likewise, the issue has been widely investigated and discussed in previous research (Jazairy et al., 2024; Prataviera et al., 2023), which has come to classify such practices as internal - including green warehousing, innovative packaging design and management, distribution planning and transportation execution, and internal management tools such as traceability - or external (i.e., green purchasing, collaboration with customers, other collaborations) (Centobelli et al., 2020).*

When discussing green logistics, LSPs are considered key players as they manage the systems and actually perform the operations that ultimately produce emissions (Huge-Brodin et al., 2020). From a LSP perspective, previous research has investigated the role of other stakeholders, together with contextual factors, to explain the adoption of GLPs (Centobelli et al., 2017; Prataviera et al., 2023; Schmidt et al., 2017). From a logistics buyer perspective, research has emphasized that purchasing managers are including environmental performance evaluations alongside economic criteria when selecting suppliers (Foerstl et al., 2015; Goebel et al., 2012). Experimental evidence has further supported that when environmental performance is incorporated as a criterion, it can serve as a differentiator in selection decisions (Davis-Sramek et al., 2020; Thomas et al., 2016). However, LSPs and their customers (i.e., logistics buyers) have different perspectives on environmental sustainability and extant studies point to poor alignment and mismatch between LSPs offerings and buyers' requirements (Huge-Brodin et al., 2020; Jazairy et al., 2021). It remains unclear the managers' decision-making in an LSP-selection situation, and how they evaluate individual GLPs or combinations of them, in a context characterized by scarce environmental performance metrics on one side and increasing pressure to report and reduce Scope 3 emissions on the other. To understand how decision-makers make value judgments in green LSPs selection, we turn to theoretical insights from BDT (Morton & Fasolo, 2009).

Behavioral decision theory. *Scholars have long been intrigued by how individuals choose among various alternatives (Roe et al., 2001). The evolution of behavioral decision theory began in the 1950s, a period during which the assumptions of rational choice theory were increasingly questioned (Slovic, 1995). Instead of assuming that a decision maker has the computational ability to determine the option that maximizes expected utility (Bettman et al., 1998), it is argued that individuals aim for outcomes that are satisfactory but not necessarily maximized. This shift in perspective paved the way for an approach to decision-making grounded in the concept of bounded rationality-which acknowledges inherent limits in information processing capacity (Simon, 1955; Bettman et al., 1998). Further developments in BDT have underscored that, due to these cognitive capacity constraints, decision-makers employ a range of information processing and decision-making strategies (Roe et al., 2001; Jiang & Punj, 2008).*

Moreover, there is a growing consensus among behavioral researchers that preferences are not simply revealed during the decision process; rather, they are actively constructed as individuals selectively draw upon both the information at hand and what is stored in memory (Slovic, 1995; Bettman et al., 1998; Anderson & Clemen, 2013) when they are making a choice. This dynamic often requires decision-makers to face challenging trade-offs among alternatives, a central theme in the literature on preference construction (Payne et al., 1999). Although this approach has not been widely applied in empirical sustainable supply chain management research, understanding how managers build preferences in their decision-making can offer critical insights.

According to BDT, when decisions become cognitively demanding, decision-makers tend to rely on simple heuristics or "rules of thumb" instead of taking the time to consider possible trade-offs among options (Morton & Fasolo, 2009). In such cases, a preference is formed by creating a dominance relationship, and one criterion in the choice set overshadows all others. This strategy simplifies the decision-making process by denoting one criterion as the most critical factor (Bettman et al., 1998; Montgomery, 1983). Building on these insights, BDT suggests that in LSP selection, a dominance relationship can emerge when evaluations of the different GLPs are considered in light of their salience and the justifiability of prioritizing one over the others (Bettman et al., 1998).

Building on previous research, which indicates that LSPs engage more extensively in selling GLPs than shippers (i.e., logistics buyers) do in buying them (Abbasi & Nilsson, 2016; Martinsen & Björklund, 2012; Wolf & Seuring, 2010) and that this situation is not uniformly applicable to all GLPs nor to all purchasing phases (Jazairy & Von Haartman, 2020), we argue that logistics buyers form their preferences on different GLPs based on individual value judgments (i.e., heuristics and "rules of thumbs"). In line with this thought, we adopt insights from BDT, which emphasizes that managerial preferences' construction happens through salience and justifiability. First, decision-makers process information selectively, with attention given to the most salient dimension among a choice of options. As a result, they examine alternatives and place more significance on that dimension (Jiang & Punj, 2008). Second, decision-makers are

held accountable and must often be able to justify or provide reasons for a decision (Shafir et al., 1993). Bettman et al. (1998) assert that decision-makers look for a strong case for justification. This theoretical perspective provides the rationale to hypothesize that the internal practices related to green packaging design and management, as well as the internal practices linked to supply chain traceability, will be the most important. Furthermore, external practices related to green monitoring and data sharing will strengthen buyers' selection decisions.

Methodology. *To test the relationships proposed in the hypotheses, we use a series of scenario-based between-subjects behavioral experiments (Rungtusanatham et al., 2011). This approach aligns with other supply chain studies that examine human behavior and decision-making (Eckerd & Bendoly, 2011; Tokar, 2010; Zhu et al., 2024). Experimental designs leverage the power of random assignment, isolate effects from potential confounding conditions, enable manipulation of variables of interest, and maximize the internal validity of the research (Knemeyer & Naylor, 2011). Scenario-based experimental designs are particularly useful because they enable the study of situations where organizations may be unwilling to share confidential details (Thomas et al., 2010). This research will be conducted with a focus on what participants would do in specific scenarios in a situation that did not have an optimal solution. Therefore, participants will be given a set of instructions among which specifically stated that there will be no right or wrong answers.*

The behavioral experiments will use different scenarios to manipulate the GLP in a LSP selection context. Data will be collected via the online crowdsourcing platform Prolific Academic through a survey built on the Qualtrics software. Respondents will be full-time working managers operating in the logistics and supply chain functions. Internal GLP adoption is the main independent variable with four levels of treatment (green warehousing, innovative packaging design and management, distribution planning and transportation execution, and supply chain traceability). Independent variable effects will be measured on the dependent variable of purchase intention, defined as the willingness to buy the service of a specific LSP (Hardesty et al., 2002). External GLP adoption is the moderator variable manipulated with three levels of treatment (green purchasing, collaboration with customers, and other collaborations). We will collect participants' demographic information such as their age, specific role in the company, and information about their companies, such as the industry sector.

Expected results. *Logistics buyers making LSP selection decisions with green supply chain management concerns will form their preference based on the salience of GLPs information and on the justifiability of their choices. Among the internal GLPs, we expect logistics buyers to be more likely to perceive packaging and traceability of emissions data practices as the most salient in the LSP selection decision. Indeed, logistics buyers may highly emphasize green packaging due to their role and responsibility in applying eco-design regulations to reduce product waste (Lun et al., 2015; Sureeyatanapas et al., 2018). Likewise, traceability of emissions data is considered salient as it may be used for reporting and communication purposes, thus anticipating positive consequences for the buyers' own firm.*

Furthermore, as managers making LSP selection decisions must be able to justify their choice, focusing on the most prominent dimension constitutes a sound argument (Irwin & Davis, 1995). Here, the increased sensitivity of final consumers with respect to climate change issues and firms' sustainability initiatives, together with the role of extant reporting requirements, make decisions of prioritizing packaging and emissions data more defensible.

In sum, we expect two categories of internal green logistics practices, namely those related to green packaging and management and those related to supply chain traceability with emissions data, to emerge as especially influential. These practices are likely to prevail in the decision-making process as they align with managers' need to justify choices based on familiar and measurable criteria, thereby creating a dominance relationship in which packaging practices and traceability of emissions data stand out as critical factors in the selection of logistics service providers.

Following a similar reasoning, we expect that among the external GLPs, logistics buyers will be more positively influenced by green monitoring and data sharing. These practices will reinforce their selection decisions.

Research limitations. *This research presents some inherent limitations. From a methodological perspective, scenario-based experimental methods, while strong in internal validity, often suffer from lower external validity. Additionally, the scenario-based experimental design captures buyers' intentions but does not measure actual or observed behavior in decision-making contexts. Although this approach aligns with the study's objectives, it may lack realism, which could limit the generalizability of the findings. This study focuses on the single perspective of logistics buyers, excluding the perspectives of LSPs and other stakeholders, such as consumers.*

Managerial implications. *This research aims at providing timely guidance for managers at logistics service provider firms seeking to align their sustainability initiatives with buyer expectations. Indeed, we enlighten the decision-making process of logistics buyers, providing information regarding selection criteria that can be used by LSPs to market their GLPs and to maximize the fit between green logistics offerings and requirements. Ultimately, bridging the gap between LSPs offerings and buyer expectations remains a central challenge in achieving a more sustainable logistics ecosystem.*

Originality of the paper. *Recent European directives requiring firms to report supply chain emissions (primarily Scope 3 emissions) have placed LSPs under increasing scrutiny, making GLPs more relevant than ever for logistics buyers. Despite growing attention, prior studies have tended either to treat GLPs as a single, monolithic construct or to focus qualitatively on a single practice, leaving the combined effect of multiple GLPs on managerial decision-making unexplored. To our knowledge, there is no empirical research simultaneously testing the relative importance of different internal and external GLPs on managerial decision-making behavior. This research addresses that gap by employing an*

experimental design to test managers' decisions with respect to different GLPs, thus providing a more nuanced view of how logistics buyers evaluate sustainable offerings.

A key contribution lies in the application of behavioral decision theory, which illuminates how individual-level cognitive processes - beyond stakeholder and contextual factors that have been investigated in previous literature to explain GLP adoption - influence the decisions about GLPs. In doing so, we offer a novel perspective that bridges theoretical insights on decision-making with the practical realities of LPS selection. Our focus on both internal and external GLPs provides timely guidance for logistics managers seeking to align their sustainability initiatives with buyer expectations. Moreover, our findings pave the way for future research to explore how different types of buyers, as well as diverse functional roles within firms, may further shape the importance attached to various GLPs.

Key words: *green logistics practices; logistics service provider; supplier selection; decision-making; behavioral decision theory; experimental design*

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Natural resource scarcity and green supply chain management of the firm

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Abstract

Natural resource scarcity (NRS) poses a growing challenge for firms and supply chains, as dependence on scarce resources threatens both financial performance (FP) and organizational survival. To address these challenges, firms increasingly adopt green supply chain management (GSCM) practices aimed at mitigating the adverse effects of NRS. However, existing studies on the relationship between GSCM and FP have produced mixed results, as the benefits of GSCM unfold over the long term and are influenced by various indirect factors. This paper aims to study the relationship between GSCM practices and FP of the firm, and to understand how NRS shapes this relationship. We conceptualize the influence of NRS through four distinct types of uncertainty perceived by firms: ecological, regulatory, market, and stakeholder reputation uncertainties, and propose that this influence can be studied as a moderation effect that weakens (in the case of ecological uncertainty) or strengthens (for regulatory, market and stakeholders' reputation uncertainties) the relationship depending on whether the uncertainty involves organizational interrelationships or directly nature. Analysis of a sample of large firms in natural-resource intensive industries for the period of 2014–2023 consistently supports our theoretical propositions. The findings contribute to advancing research on natural resource management and supply chains by demonstrating the indirect effects of NRS on the relationship between GSCM and FP, and analyzing simultaneously both physical and non-physical drivers of business responses to NRS.

Keywords: *natural resource scarcity; green supply chain management; financial performance; carbon disclosure project; sustainability*

Framing of the research. *Natural resource scarcity (NRS) is one of the most pressing Grand Challenges which our society needs to face in the upcoming years (George et al., 2015; George et al., 2016). NRS is primarily caused by human-driven overexploitation of natural ecosystems that generate resources, along with climate change, biodiversity loss, and other interrelated global challenges (Rockstrom et al., 2009). Its effects on firms are becoming increasingly apparent and critical to the firms' survival, whenever dependent on scarce natural resources to operate their business (Tashman, 2021). Starting from the end of the 20th century, NRS has driven an ever-increasing vulnerability of long and complex supply chains (Wagner & Bode, 2008), whose impacts were made clear both by climate-change led natural disasters and by anthropogenic disasters as the pandemic outbreak in 2020 and the Russian-Ukrainian conflict in 2022.*

Facing increasing exposure to NRS, it is critical for firms and supply chains to mitigate and address its consequences by implementing green supply chain management (GSCM) practices. Tashman and Rivera (2016) were the first to highlight how direct dependence on scarce natural resources influences firm behavior. They demonstrated that NRS creates uncertainty for the firm concerning direct access to natural resources (ecological uncertainty), prompting them to adopt resource-intensive adaptation strategies (Tashman & Rivera, 2016). However, NRS introduces uncertainty for the firm also regarding the consequences on other organizations of its ecological impacts. This broader uncertainty manifests as regulatory uncertainty (Kassinis & Vafeas, 2006), market uncertainty (Paulraj & Chen, 2007; Wong et al., 2011), and stakeholders' reputation uncertainty (Sharma & Enriques, 2005; Kassinis & Vafeas, 2006). According to Tashman and Rivera (2016), firms respond to these uncertainties differently depending on whether the uncertainty stems from relationships with other organizations or with nature. However, existing research has not adequately addressed both physical and non-physical drivers of business responses to NRS (Unter et al., 2024).

While some firms and industries have a direct dependence on natural resources, it can also be indirect, arising from organizational interdependencies with other upstream or downstream supply chain actors outside the firm's control (Tashman & Rivera, 2016; Kalaitzi et al., 2018). George et al. (2015) emphasize the need for more research on natural resource and GSCM, as the existing literature lacks a comprehensive understanding of how NRS contributes to supply chain disruptions and, more broadly, affects firm performance.

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This study aims to fill that gap by examining the effects of these four types of uncertainty as perceived by firms on the relationship between GSCM and financial performance (FP) of the firm. The paper thus emphasizes the supply chain level, where GSCM involves strategically integrating environmental considerations into both forward and reverse logistics. This integration is achieved through implementing various environmental practices aimed at minimizing negative environmental impacts throughout the supply chain (Zhu & Sarkis, 2004; Srivastava, 2007). GSCM practices are generally classified into internal and external practices (Zhu & Sarkis, 2004; Zhu & Sarkis, 2006; Choudary & Sangwan, 2022; Lee et al., 2012).

Internal practices include Internal Environmental Management (IEM) and Eco-Design (ECD). IEM practices focus on reducing pollutants' emissions, minimizing waste and e-waste, lowering water consumption, enhancing policies for water and energy efficiency, and initiating environmental restoration efforts. In contrast, ECD practices emphasize designing products for reuse and recycling, incorporating features that promote responsible usage, and implementing environmental labeling and marketing (Miroshnychenko et al., 2017; Ortas et al., 2014; Laari et al., 2018; Kong et al., 2021). These internal practices can be managed independently by firms to mitigate environmentally harmful activities within their operations (Jell-Ojobor & Raha, 2022).

External practices encompass Green Purchasing (GPU) and Cooperation with Customers and Suppliers (COP) on environmental objectives. GPU involves integrating environmental criteria into procurement decisions, including sourcing materials, selecting suppliers, and terminating partnerships when criteria are unmet. COP includes collaborative efforts with customers and suppliers to reduce the environmental impact of the supply chain, such as shared responsibility policies, joint investments, cooperative eco-design initiatives, and environmental training (Miroshnychenko et al., 2017; Ortas et al., 2014; Laari et al., 2018; Feng et al., 2018). Unlike internal practices, external GSCM practices require coordinated efforts with external stakeholders, such as suppliers and customers, to be effectively implemented (Jell-Ojobor & Raha, 2022).

Purpose of the paper. *We study the relationship between GSCM practices and FP of the firm and explore the mechanisms by which uncertainties created by NRS affect this relationship. When investigating the impact of GSCM practices on FP, literature lacks agreement between short-term perspective studies which affirms no significant influence of GSCM practices on FP (Laari et al., 2018; Feng et al., 2018; Rodríguez-González et al., 2022) and the long-term investigations which instead have proposed a positive influence on FP (Jell-Ojobor & Raha, 2022; Miroshnychenko et al, 2017). We postulate that the effect of GSCM practices on FP is positive in the long term as a reflection of the reduction in firm's environmental impact, increased eco-efficiency and/or better collaborations with supply chain members for environmental goals (Dangelico & Pontrandolfo, 2015; Porter & Van der Linde, 1995; Zhu & Sarkis, 2004). As such, we formulate the following hypothesis:*

H1. *Adoption of GSCM practices has a positive effect on firms' FP in the long term.*

If GSCM practices indeed affect a firm's financial performance, the objective of this paper is to understand how the effect may vary under NRS. Examining the boundary conditions developing from NRS can enhance the understanding of the mechanism underlying the main effect and contribute to advancing research in GSCM, corporate FP and natural resource scarcity. We build on the Natural Resource Dependence Theory (NRDT) to analyze the contingency effects of NRS. NRDT is a theoretical perspective envisioned to consider the effects of NRS on firms whenever they are dependent on scarce natural resources (Tashman, 2021). Therefore, the uncertainty perceived by the firm may direct GSCM practices more towards eco-innovation rather than compliance with environmental regulations, or more towards collaboration with partners rather than internal eco-efficiency. We argue that the study of the indirect influences helps the comprehension of the mechanisms by which the relationship between GSCM practices and FP develops throughout time (Feng et al., 2018; Zhao et al., 2021), and propose that the influence of NRS can be studied as a moderation effect that weakens (ecological uncertainty) or strengthens (regulatory, market and stakeholders' reputation uncertainties) the relationship depending on whether the uncertainty involves organizational interrelationships or directly nature. This could happen since the direct relationship between firms and the natural environment does not involve organizational interdependence, meaning firms encounter fewer limitations from other organizations in their resource use, while when other organizations are involved then the firm perceives to be constrained in limiting natural resource exploitation (Tashman & Rivera, 2016; Ostrom, 1999; Kassinis & Vafeas, 2006; Paulraj & Chen, 2007; Sharma & Henriques, 2005). We thus propose the following hypotheses:

H2. *Ecological uncertainty negatively moderates the relationship between GSCM practices and FP.*

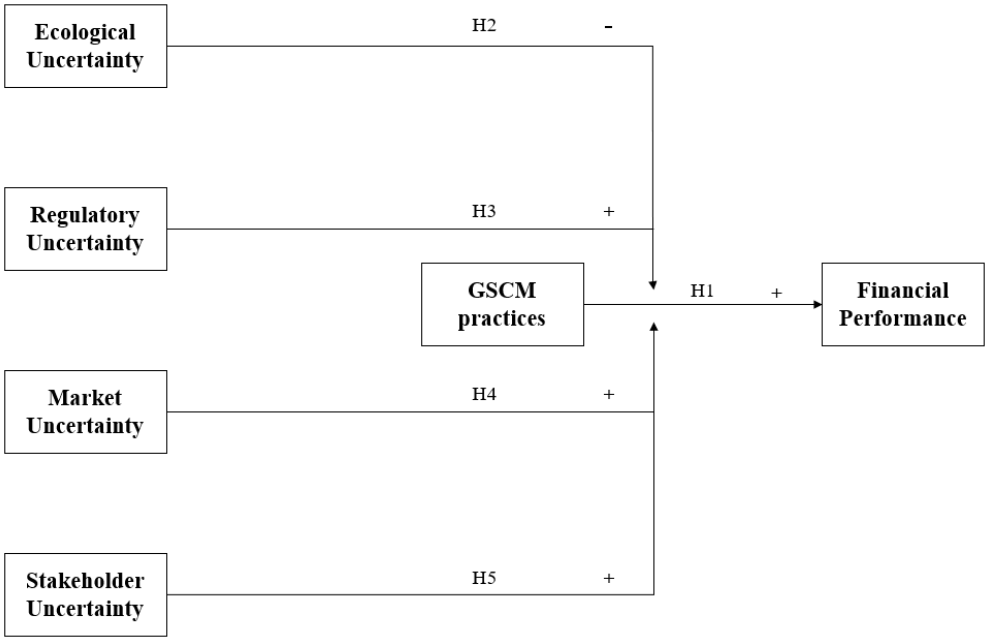
H3. *Environmental regulatory uncertainty positively moderates the relationship between GSCM practices and FP.*

H4. *Market environmental uncertainty positively moderates the relationship between GSCM practices and FP.*

H5. *Stakeholder environmental reputation uncertainty positively moderates the relationship between GSCM practices and FP.*

Figure 1 *presents the theoretical model of the study.*

Fig. 1: theoretical model and hypotheses



Methodology. *The data for this study is drawn from various reliable sources. We begin by collecting GSCM data from the Environmental, Social, and Corporate Governance (ESG) module of the London Stock Exchange Group (LSEG) Refinitiv Workspace. This module provides comprehensive insights across numerous ESG themes, including emissions, environmental product innovation, human rights, and supply chain management (LSEG, 2024).*

To complement this, we integrate financial and accounting information, such as firm size, profitability, and industry sector, using the LSEG Workspace Ownership module. Additionally, we gather data on firms' perceived uncertainty variables-acting as moderating variables-from the Carbon Disclosure Project (CDP). As a non-profit organization, CDP has conducted annual surveys since 2003, collecting extensive data on climate change and its implications for businesses, alongside information related to forests, water security, biodiversity, and supply chain management. With what it claims to be the world's largest primary corporate climate change database (CDP, 2024), CDP offers consistent assessments of climate change-related risks by directly addressing physical and regulatory factors relevant to environmental and natural resource management. The choice to use CDP data for building uncertainty variables is based on its systematic approach to evaluating environmental risks since the inception of its surveys. Its methodology effectively captures the physical and regulatory factors that potentially impact business activities, making it a valuable source for our analysis.

The actual sample, upon which this abstract was drafted, comprises 1,895 firm-year observations from 302 companies spanning 37 countries and five industries over a ten-year period (2014–2023), where both LSEG and CDP data are available. The sample is going to be refined and enlarged in the next developments of this research. To ensure relevance, we focus exclusively on firms operating in natural-resource-intensive industries identified by previous research as particularly vulnerable to NRS concerns: Energy, Metals & Mining, Utilities, Food Products, and Paper & Forest Products (Sharma & Henriques, 2005; Dias et al., 2022; de Abreu et al., 2017; Bowen et al., 2018). The industry breakdown shows a heavy representation of Utilities, Energy, and Metals & Mining, while companies from the Paper & Forestry and Food sectors are less prevalent. Geographically, most of the sample originates from the United States, followed by other major Anglo-Saxon economies like Canada, the United Kingdom, and Australia, along with significant portions from Italy and Brazil. The remaining data encompasses companies from various countries worldwide. Consistent with the methodologies used by Wang and Sarkis (2013) and Jell-Ojobor and Raha (2022) in similar panel data studies, we include only firms with complete data for every year within the study period to maintain a balanced panel dataset.

Following the approach of Jell-Ojobor and Raha (2022), we operationalize our dependent variable of financial performance through two indicators, ***Return on Assets (ROA)*** *and* ***Return on Equity (ROE)****. ROA measures a company's operational efficiency by dividing its net income after taxes by its total assets. Meanwhile, ROE evaluates a company's financial performance by dividing its net income after taxes by the book value of equity. To reduce the weight of extreme outliers, ROA and ROE have been winsorized at the 1th and 99th percentiles. The independent variable in our model is GSCM practices, which is operationalized through 4 subdimensions (Zhu and Sarkis, 2006):* ***internal environmental management (IEM)****,* ***eco-design (ECD)****,* ***green purchasing (GPU)*** *and* ***cooperation with customers and suppliers (COP)****. GSCM practices variable is measured as the sum of IEM, ECD, GPU and COP. For the moderating variables, we utilized data from the "Risk and Opportunities" section of the Climate Change questionnaire provided by the CDP (CDP, 2023). This section requires firms to identify their perceived environmental risks, which are categorized into eight*

types: current regulation, emerging regulation, legal, technology, market, reputation, acute physical, and chronic physical. To construct these variables, we grouped the risks as follows:

- ***Environmental Regulatory Uncertainty (re_unc):*** *Derived from current regulation, emerging regulation, and legal risks.*
- ***Market Environmental Uncertainty (ma_unc):*** *Built using technology and market risks.*
- ***Environmental Stakeholders' Uncertainty (st_unc):*** *Based on reputation risks.*
- ***Ecological Uncertainty (ec_unc):*** *Formed by combining acute physical and chronic physical risks.*

For each identified risk, firms disclose both the likelihood and magnitude of impact. We measured each uncertainty variable using a risk exposure formula commonly applied in supply chain risk management (Tummala & Schoenherr, 2011). This formula calculates risk exposure as the product of a consequence index (magnitude of impacts) and a probability index (likelihood of impacts). To account for the additive nature of multiple risks perceived by a firm within the same category, we added a constant when more than one risk type was reported (Bergmann et al., 2016). If a firm did not report any risk related to a specific category (e.g., reputation risk), the corresponding uncertainty variable was set to zero. Finally, following Miroshnychenko et al. (2017), financial leverage, firm size, country, industry and year dummies are included as control variables.

In order to test the hypotheses of this paper, we employed the following as base model:

$$FP_{it}=b_0+b_1(GSCM_{it-1})+b_2(ec_unc_{it-1})+b_3(ma_unc_{it-1})+b_4(st_unc_{it-1})+ \\ +b_5(re_unc_{it-1})+b_6(controls_{it-1})+d_{year}+err_{it}$$

Building on prior research on social and environmental responsibility (Gao & Bansal, 2013; Miroshnychenko et al., 2017; Jell-Ojobor & Raha, 2022; Hart & Ahuja, 1996; Wang & Sarkis, 2013), we posited that the benefits of implementing GSCM practices would materialize with a time lag of at least one year. To address potential endogeneity, we applied a one-year lag to the GSCM practices, uncertainty variables, and control variables. To examine the moderating effect of each uncertainty variable, we introduced interaction effects by creating additional models where each uncertainty variable interacted individually with GSCM practices. This approach allowed us to test the distinct moderating role of each uncertainty type. We employed a fixed effects estimator to account for omitted variable bias, specifically using firm fixed effects to control for time-invariant unobserved heterogeneity across firms. The decision to use the fixed effects estimator was based on the results of Hausman's (1978) test, which demonstrated a significant difference between fixed and random effects estimators ($p < 0.001$ for both ROA and ROE). This outcome suggests strong correlations between regressors and error terms, confirming that the fixed effects model was the appropriate choice. Accordingly, we applied a panel linear regression model with firm fixed effects to effectively capture time-invariant characteristics and between-firm heterogeneity (Wooldridge, 2002).

Results. *As an on-going project, results are yet to come in their final form. The dataset is still to be consolidated and this prevents the chance to present the final outcomes. However,* **Table 1** *presents some preliminary findings based on the firms analyzed so far.*

Models 1 and 2 examine the main effects of GSCM practices in the previous year on firm's ROA and ROE, respectively. In support of Hypothesis 1, the results indicate that the adoption of GSCM practices brings an increase of 0,0029 units of ROA (0,29%) and of 0,0043 units of ROA (0,43%). P-values indicate high significance of both relationships.

Models 3-10 test the interaction effects between GSCM practices and the four uncertainty variables on financial performance, which is measured both as ROA and ROE for each interaction effect. Hypothesis 2 predicts that ecological uncertainty weakens the effect of GSCM practices on FP, and it is supported by the results of models 3-4, in which the interaction term GSCM x ec_unc is negative and significant ($\beta = -0.0055$, $p = 0.007$ for ROA; $\beta = -0.0091$, $p = 0.012$ for ROE). Hypothesis 3 which predicts that regulatory uncertainty strengthens the effect of GSCM practices on FP is supported by model 7 ($\beta = 0.0064$, $p = 0.001$), however the interaction term is not significant in model 8, suggesting a different interpretation between ROA and ROE as dependent variable. The same holds for Hypothesis 5 which predicts that stakeholders' reputation uncertainty strengthens the effect of GSCM practices on FP. It is supported by model 9 ($\beta = 0.0062$, $p = 0.023$), but not by model 10. Finally, models 5-6 test Hypothesis 4 which predicts that market uncertainty strengthens the effect of GSCM practices on FP. However, the hypothesis is not supported as the interaction term is not significant in both models.

Tab. 1: effects of green supply chain management practices on financial performance and moderation effects

Model	**-1**	**-2**	**-3**	**-4**	**-5**	**-6**	**-7**	**-8**	**-9**	**-10**
Dep. variable	**ROA**	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**	**ROA**	**ROE**
Constant	0,0589	0,0913	0,0352	0,0578	0,0624	0,0891	0,0920	0,1059	0,0684	0,1013
	(0,000)	(0,000)	(0,027)	(0,041)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
Size$_{t-1}$	-5,51e-13	-1,32e-12	-5,44e-13	-1,31e-12	-5,54e-13	-1,32e-12	-5,58e-13	-1,33e-12	-5,38e-13	-1,31e-12
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,001)	(0,000)
Leverage$_{t-1}$	-0,0605	0,0578	-0,0608	0,0571	-0,0605	0,0588	-0,0592	0,0583	-0,0595	0,0585
	(0,000)	(0,015)	(0,000)	(0,016)	(0,000)	(0,013)	(0,000)	(0,014)	(0,000)	(0,014)
GSCM$_{t-1}$	0,0029	0,0043	0,0051	0,0077	0,0024	0,0039	0,0002	0,0027	0,0021	0,0036
	(0,001)	(0,008)	(0,000)	(0,000)	(0,013)	(0,027)	(0,887)	(0,209)	(0,034)	(0,045)
ec_unc$_{t-1}$			0,0622	0,0934						
			(0,014)	(0,034)						
ma_unc$_{t-1}$					-0,0137	0,0113				
					(0,519)	(0,767)				
re_unc$_{t-1}$							-0,0793	-0,0357		
							(0,001)	(0,390)		
st_unc$_{t-1}$									-0,0798	-0,0904
									(0,014)	(0,130)
GSCM x ec_unc			-0,0055	-0,0091						
			(0,007)	(0,012)						
GSCM x ma_unc					0,0018	0,0013				
					(0,313)	(0,683)				
GSCM x re_unc							0,0064	0,0037		
							(0,001)	(0,277)		
GSCM x st_unc									0,0062	0,0069
									(0,023)	(0,160)
Observations	1496	1631	1496	1631	1496	1631	1496	1631	1496	1631
Adj. R^2	**0,1636**	**0,1912**	**0,1687**	**0,1954**	**0,1651**	**0,1917**	**0,1714**	**0,1914**	**0,1678**	**0,1916**

Note: p-values in parentheses

Research limitations. *The first limitation of this research is related to the use of firms' voluntarily self-disclosed CDP data for measuring uncertainty variables. This could have introduced self-selection bias as firms might have done it to respond to external pressures or compensating significant environmental impacts. However, as we measured perceived uncertainty the very choice to disclose to CDP could be a signal of effective perception of ecological uncertainty, thus limiting the bias. More*over, *market uncertainty turned out to be not significant in positively mediating the relationship between GSCM practices and FP. We attribute the non-significance of market uncertainty to how it was measured by the data employed, as the CDP questionnaire only refers to non-supply chain-related technological risks or general market and product substitution threats. We call for future research to better measure this construct and understand its role in the relationship between GSCM practices and FP.*

Managerial implications. T*he results of this paper are highly relevant for managers operating in natural resource-intensive industries. This paper clearly articulates the distinction between short-term and long-term GSCM practices implementation. Although these practices may involve short-term costs by restricting the exploitation of scarce natural resources, their effectiveness will ultimately decline if NRS is not adequately addressed. In such cases, the ecological threat could surpass the firm's capacity to respond effectively. This highlights the importance of treating natural resource scarcity not as a temporary crisis but as a persistent risk demanding proactive and comprehensive management. Failure to do so may result in far more severe long-term consequences. Therefore, managers of natural resource-intensive firms should leverage the results of this study and recognize that GSCM practices can bring a competitive advantage in the long term and ultimately improve financial performance.*

Originality of the paper. *The findings of this paper bring important novelty to the GSCM literature, showing how the relationship with FP develops in the long-term, as well as the indirect effects that intervene in the relationship because of the uncertainty perceived from the dependence on scarce natural resources. Although previous literature has produced mixed results on the GSCM-FP relationships in the short vs long-term, we argue that these different points of view could have been produced by the very nature of this relationship, which develops in the long term, making room for indirect factors to intervene and skew towards more positive or more negative outcomes on firm's performance. Therefore, after demonstrating a significant positive effect of GSCM on the financial performance of the firm in the long term, meaning that, at least in natural-resource intensive industries, adoption of sustainable practices brings competitive advantage to the firm, we reveal important indirect effects related to NRS that shape the relationship in the long-term. Specifically, ecological uncertainty weakens the positive effect of GSCM on FP: this implies that direct dependence on scarce resources may intensify in the long-term making it challenging for firms to adopt sustainable practices when ecological uncertainty is high. On the contrary, regulatory and stakeholders' reputation uncertainty strengthen the positive effect of GSCM on FP, meaning that adoption of sustainable practices is able to mitigate the impacts of such risks for the firm as the external stakeholders that may pose these risks on the firm will presumably react positively to GSCM adoption.*

In this way, we contribute to the advancement of research on natural resource management and the supply chain (George et al., 2015), and address the gap of literature analyzing simultaneously both physical and non-physical drivers of business responses to NRS (Unter et al., 2024).

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The Role of Consumers in Circular Supply Chains: A Multi-Sector Case Study

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Abstract

The transition from a linear to a circular economic model is a critical response to growing environmental concerns and resource scarcity. The circular economy (CE) promotes sustainability by integrating reuse, recycling, and remanufacturing practices, with circular supply chains playing a fundamental role in ensuring continuous reintegration of materials. However, closing circularity loops remains a challenge, largely due to inconsistent consumer engagement. This paper investigates the role of consumers in CE across three industries - furniture (IKEA), cosmetics (Sephora), and fashion (Gruppo Calzedonia) - through a multiple case study approach. Findings reveal that while businesses have implemented various CE initiatives, consumer participation is inconsistent due to logistical, financial, and behavioral barriers. IKEA's circular supply chain strategy includes take-back and resale programs to extend product lifecycles, yet convenience issues hinder full consumer adoption. Sephora's circularity loop for cosmetic packaging faces limitations due to a lack of financial incentives, impacting consumer motivation. Gruppo Calzedonia's closed-loop textile recycling system has demonstrated effectiveness in incentivizing customer participation through discount-based take-back schemes, though awareness remains a challenge. This study highlights the importance of financial incentives, convenience, and consumer education in fostering engagement with CE initiatives. Theoretical contributions include integrating behavioral economics into CE research and emphasizing the need for interdisciplinary approaches that connect consumer psychology, circular supply chain management, and sustainability studies. From a managerial perspective, businesses should streamline take-back programs, enhance incentive structures, and leverage digital tools to facilitate consumer participation in circularity loops. Additionally, regulatory frameworks must support consumer-centric policies, such as standardized labeling and tax incentives for sustainable purchasing behavior. By providing a comparative cross-sector analysis, this research offers valuable insights into improving consumer participation in circular supply chains and strengthening circularity loops. Future studies should explore cultural and regional differences in consumer engagement, the role of emerging technologies in supporting CE models, and strategies to overcome behavioral resistance to sustainability practices.

Framing of the research. *The transition from a linear to a circular economic model is a response to increasing environmental concerns and resource scarcity. The traditional linear economy, based on the "take-make-use-dispose" approach (Kirchherr et al., 2017; Nikolova & Ness, 2022), has reached its limits, making the shift toward circular economy (CE) models imperative (Vidal-Ayuso et al., 2023). CE emphasizes minimizing waste and maximizing the life cycle of products by incorporating concepts such as recycling, refurbishing, reusing, and remanufacturing. The fundamental principle of CE is the creation of circular loops within supply chains, ensuring that products and materials are continuously reintegrated into the economy instead of being discarded.*

Circular supply chains play a crucial role in achieving sustainability goals. Unlike traditional supply chains, which follow a linear path from raw materials to disposal, circular supply chains are designed to retain value by looping products and materials back into the production cycle. This model integrates closed-loop supply chains, in which goods are either returned to the producer for refurbishment or repurposed into new products (Confente, 2020). Closed-loop systems enable businesses to extend product lifecycles, reduce dependency on virgin raw materials, and lower overall environmental impact.

Circular business models are increasingly relying on industrial symbiosis, where companies collaborate to minimize waste and share resources across industries. This approach enhances resource efficiency by ensuring that waste or by-products from one company serve as raw materials for another. Such partnerships not only reduce environmental impact but also create economic benefits through cost savings and innovation in material reuse (Lieder & Rashid, 2016).

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Transparency and consumer education on these interconnected circular systems are essential to reinforcing trust and participation in circular economy initiatives (Geissdoerfer et al., 2017).

However, the success of circular supply chains largely depends on consumer participation. Consumers are no longer passive buyers but active contributors to CE models. Their role extends beyond purchasing decisions to include responsible disposal, participation in take-back programs, and choosing products designed for longevity (Camacho-Otero et al., 2020; Mugge, 2018). In fact, unlike traditional linear models where consumers are passive end-users, circular supply chains require consumers to take an active role in product lifecycle extension. This includes not only responsible purchasing but also engagement in reuse, recycling, and upcycling initiatives. The success of circular models depends on consumers' willingness to participate in take-back schemes, adopt sustainable consumption habits, and demand transparency regarding product circularity. As highlighted in recent research, fostering consumer awareness and incentivizing behavioural change are essential to closing circularity loops and ensuring long-term sustainability. The engagement of consumers in circular loops influences key sustainability indicators, such as reduced waste production, lower carbon emissions, and decreased consumption of natural resources (Bocken et al., 2016; Frishammar & Parida, 2019).

Despite the clear benefits of consumer involvement, literature has identified a gap in understanding consumer behavior within the CE framework. Many studies focus on the business-side implementation of circular models, often overlooking the critical role of consumers in post-consumption phases (Vidal-Ayuso et al., 2023). The traditional economic perspective has often treated consumers as end-users rather than active participants in supply chains. This oversight is particularly evident in studies on waste management, product lifecycle extension, and the adoption of sustainable consumption patterns (Maitre-Ekern & Dalhammar, 2019).

A key challenge in achieving circularity is educating consumers about their role in sustaining circular supply chains. Many consumers lack awareness regarding the impact of their choices, such as selecting durable products, properly recycling materials, and engaging in refurbishment or resale initiatives (Testa et al., 2020; Vehmas et al., 2018). Furthermore, behavioral barriers, such as convenience, perceived effort, and economic incentives, significantly influence consumer participation (Asikis et al., 2023). Businesses must address these challenges through targeted marketing campaigns, incentives, and transparent communication of sustainability benefits (Tabas et al., 2025).

One of the major barriers to consumer participation in circular economy initiatives is the perceived lack of convenience and economic incentives (White et al., 2019; Camacho-Otero et al., 2020). Many studies indicate that consumers are more likely to engage in take-back programs and recycling schemes when financial benefits, such as vouchers or discounts, are provided (Testa et al., 2020; Lieder & Rashid, 2016). Moreover, psychological factors, including effort perception and trust in the recycling process, influence participation rates (Vermunt et al., 2019). To enhance consumer engagement, businesses should design seamless and rewarding circular programs that minimize logistical burdens, offer tangible incentives, and transparently communicate the impact of consumer actions on sustainability.

To bridge this gap, this paper investigates how consumers contribute to CE in three key industries: furniture, cosmetics, and fashion. These sectors have implemented various strategies to involve consumers, such as product take-back schemes, resale programs, and recycling initiatives. By analyzing these cases, this paper aims to fill the gap in understanding consumer engagement in CE and its implications for businesses. The selected case studies illustrate both successful consumer engagement strategies and persistent challenges in closing the material cycle.

Consumer participation in CE represents a significant shift in market dynamics. Traditional business models relied on continuous consumption, whereas circular models emphasize long-term value retention. As a result, companies must rethink their supply chains and redefine their relationships with consumers. The demand for sustainable and circular products is increasing, pushing retailers and manufacturers to adapt their strategies accordingly (Zeng et al., 2015; Rivera & Lallmahomed, 2016). The integration of digital tools, such as product tracking systems, repair tutorials, and online marketplaces for second-hand goods, has also facilitated consumer involvement in CE (Özkan, 2021; Van Weelden et al., 2016). Emerging technologies like blockchain and AI are also gaining attention for their potential to enhance transparency, traceability, and personalization in circular supply chains (Geissdoerfer et al., 2017; Tabas et al., 2025).

In summary, while businesses have made strides in adopting circular models, the active engagement of consumers remains a decisive factor in achieving sustainability goals. This paper contributes to existing literature by highlighting the need for a more comprehensive approach that includes consumer education, incentives, and systemic changes in business operations to promote circularity.

Purpose of the paper. *The primary objective of this paper is to assess the extent of consumer involvement in CE and its effectiveness in achieving sustainability goals. The study seeks to:*

- *examine how leading companies across different industries integrate consumer participation into their CE strategies.*
- *Identify key challenges and barriers faced by consumers in adopting circular behaviors.*
- *Propose actionable strategies for businesses to enhance consumer engagement in CE practices.*

By addressing these objectives, the paper contributes to bridging the gap between theoretical CE models and practical implementation, emphasizing the necessity of consumer awareness and active participation.

Methodology. *This study adopts a qualitative research design based on a multiple case study approach, allowing for a comprehensive understanding of consumer participation in CE across different industries. The multiple case study methodology, as described by Yin (2009), enables the comparison of diverse practices within different sectors, identifying similarities, variations, and best practices in consumer engagement. This method is particularly suited to studying real-*

world applications of circular economic initiatives and their effectiveness in influencing consumer behavior (Tisdell et al., 2025).

Data collection was conducted by gathering data from corporate sustainability reports, company websites, press releases, and publicly available business documents. Additionally, social media platforms and online consumer forums were analyzed to capture consumer sentiments and behaviors regarding CE initiatives. Other data to be discussed within the cases was derived from academic literature, government and institutional reports, and industry publications that discuss the role of consumers in circular economy models.

To ensure data reliability and validity, triangulation was employed by cross-referencing findings from multiple sources. The time frame for data collection spanned from March to April 2024, providing a current snapshot of CE initiatives and consumer engagement trends. All initiatives were still active at the time of data collection.

The selection of case studies was based on three primary criteria:

1. *Industry Relevance: the cases were chosen from industries with significant environmental footprints, namely furniture (IKEA), cosmetics (Sephora), and fashion (Gruppo Calzedonia). These sectors represent areas where consumer participation is critical in achieving CE objectives.*
2. *Implementation of Circular Initiatives: companies were selected based on their active implementation of CE strategies, including take-back programs, product resale models, recycling initiatives, and circular product designs.*
3. *Consumer Engagement Efforts: the study focuses on companies that have made explicit efforts to involve consumers in their circular supply chains, through incentives, awareness campaigns, and innovative CE practices.*

Each case study was analyzed through the lens of consumer engagement in CE. The following dimensions were considered:

- *Consumer Participation Mechanisms: how companies encourage customers to return, reuse, or recycle products.*
- *Effectiveness of Circular Initiatives: the impact of CE programs in terms of product lifecycle extension, waste reduction, and consumer adoption rates.*
- *Barriers to Consumer Engagement: challenges faced by businesses and consumers, such as logistical constraints, awareness gaps, and financial considerations.*

To structure the analysis, the collected data was categorized into themes that reflect consumer behaviors and company strategies. Pattern matching and thematic coding were applied to extract key insights, following established qualitative analysis techniques (Miles & Huberman, 1994). Thematic coding was conducted manually using an iterative process. Emerging themes were first identified inductively from the data, then refined through cross-case comparisons to ensure consistency. Particular attention was paid to recurring patterns related to consumer motivations, perceived barriers, and company communication strategies.

The findings provide an empirical foundation for understanding consumer engagement in CE and offer practical recommendations for improving participation rates in circular business models. The multiple case study approach allows for the identification of industry-specific factors while also highlighting overarching trends applicable across sectors.

Results. *The findings presented in the following sections derive from triangulated analysis of corporate documents, sustainability reports, and consumer-generated content from online platforms and forums. Each case integrates company-provided data with consumer perspectives and academic literature to offer a balanced interpretation. Where strategic recommendations are proposed, these are either derived from patterns in consumer feedback, consistent practices across cases, or grounded in existing literature on CE and consumer behavior.*

***Furniture Sector - The Case of IKEA**. The furniture industry has a significant environmental impact due to its extensive use of natural resources, including wood, metals, and plastics. Many furniture products are discarded after short-term use, contributing to landfill waste. However, circular business models in this sector aim to extend product lifecycles and enhance sustainability.*

IKEA has taken a leading role in integrating CE principles into its operations. The company has committed to becoming fully circular by 2030, implementing take-back schemes, and using recycled materials in production. One of the most notable initiatives is the "Buy Back & Resell" program, where customers can return used furniture in exchange for store credits. These items are then resold in IKEA's "Circular Hubs."

However, logistical challenges remain. Customers must transport fully assembled furniture, which can be cumbersome. Additionally, the financial incentives offered might not be sufficient to motivate large-scale participation. To enhance engagement, IKEA has explored partnerships with third-party logistics providers to facilitate product returns.

While IKEA's 'Buy Back & Resell' program represents a strong commitment to circularity, logistical challenges remain a significant barrier to consumer participation. One of the primary obstacles, as emerged from a consumer forum, is the requirement for customers to transport fully assembled furniture back to stores, which can be cumbersome and costly. Currently, IKEA offers rental van services through external providers, but the additional expense may discourage participation. A potential improvement would be the development of an in-house pick-up service, making returns more accessible and financially viable. By reducing logistical burdens and providing direct home collection options, IKEA could further increase engagement in its circular economy initiatives.

Digital tools, such as an online resale marketplace, are also being developed to streamline the process. Moreover, the company has been investing in modular and reparable furniture designs, making it easier for consumers to replace parts instead of discarding whole products.

Cosmetics Sector - The Case of Sephora. *The cosmetics industry faces unique sustainability challenges due to product packaging and the difficulty of recycling small plastic containers. Many beauty products consist of mixed materials that traditional recycling streams cannot process efficiently. Sephora has launched the "Beauty (Re)Purposed" initiative, a recycling program aimed at reducing waste from cosmetic packaging. Customers can return used beauty containers to designated collection bins in stores. Sephora collaborates with Pact Collective, a non-profit specializing in sustainable disposal solutions, to recycle or repurpose these materials. While this initiative represents progress, consumer participation remains limited due to a lack of direct incentives. In addition, the program is currently limited to the United States and Canada, restricting its potential global impact. Expanding the initiative to European markets, where consumer awareness of sustainability is growing, could substantially increase participation rates and enhance brand reputation. Additionally, incorporating financial incentives, such as store credits or loyalty points for returned packaging, could further motivate consumer engagement. By broadening geographical reach and offering tangible benefits, Sephora can strengthen its role in driving circularity in the beauty sector.*

Unlike programs that offer discounts or vouchers for returns, Sephora's program relies on consumers' intrinsic motivation for sustainability. Expanding the initiative to include financial incentives or loyalty points could enhance participation. Furthermore, the company has started experimenting with refill stations for certain beauty products, allowing customers to reuse original containers instead of purchasing new ones. This approach has been met with mixed reactions, as refill accessibility varies by location and product availability.

Fashion Sector - The Case of Gruppo Calzedonia. *The fashion industry is one of the largest contributors to environmental pollution, particularly due to fast fashion's rapid consumption cycles. Many brands are now shifting toward circular models to encourage recycling and reuse.*

Gruppo Calzedonia has implemented multiple CE initiatives across its brands, including Intimissimi, Tezenis, and Falconeri. One of the key programs involves garment collection bins in retail stores. Customers can deposit used clothing in exchange for vouchers applicable toward new purchases.

This initiative effectively incentivizes consumer participation by providing tangible benefits. However, raising awareness remains a challenge. Many consumers are not fully informed about textile recycling processes or the environmental impact of discarded garments. To improve engagement, Gruppo Calzedonia has invested in educational campaigns and digital outreach efforts. Enhancing transparency regarding these post-consumer recycling processes - by sharing data on material recovery rates and product reintegration - could increase consumer trust and engagement. Communicating the end-use of recycled textiles can reinforce the credibility of circular initiatives and motivate greater consumer participation.

Another challenge is the processing of collected garments. The company collaborates with textile recycling firms to ensure the materials are properly sorted and repurposed. Some fabrics are reintroduced into production cycles, while others are redirected for alternative uses, such as insulation materials. Additionally, efforts are being made to develop closed-loop recycling techniques that would allow garments to be broken down and turned into new textiles with minimal degradation, ensuring that fabric quality remains high throughout multiple recycling cycles.

By integrating these advanced strategies, Gruppo Calzedonia is not only promoting sustainable practices but also addressing concerns regarding overproduction and waste management in the fashion industry. However, further consumer engagement strategies are needed to expand participation, including enhanced transparency in the recycling process and partnerships with eco-conscious fashion influencers.

Future efforts should focus on refining incentive structures, expanding digital tools to facilitate consumer engagement, and strengthening partnerships between businesses and sustainability organizations. By addressing these challenges, companies can ensure more effective consumer integration into circular economy initiatives.

The cross-case findings suggest that consumer participation in CE initiatives is influenced by a combination of structural factors (e.g., convenience and incentives) and cognitive-behavioral dimensions (e.g., awareness, trust in recycling). These insights extend the Theory of Planned Behavior (Ajzen, 1991), highlighting how contextual enablers can interact with attitudes and perceived behavioral control in the domain of circular consumption. The study thus contributes to an emerging stream of literature advocating for the integration of behavioral economics and supply chain sustainability (e.g., Mugge, 2018; Vermunt et al., 2019).

Research limitations. *The study is limited by its focus on three industries, potentially restricting generalizability to other sectors. Data collection relied on publicly available information, which may not capture all aspects of company initiatives or consumer perspectives. Further research could incorporate consumer surveys and interviews to gain deeper insights into behavioral motivations and barriers.*

Managerial implications. *The managerial recommendations outlined below are directly derived from patterns observed across the three case studies, particularly recurring consumer barriers (e.g., logistical complexity, limited incentives) and engagement strategies (e.g., voucher schemes, resale platforms) reported in the findings section.*

The findings of this study have significant implications for both theory and practice, emphasizing the role of consumers in circular economy (CE) and circular supply chains. The engagement of consumers is not merely a supporting factor but a central component of circular business models.

From a theoretical standpoint, this study enriches existing literature by demonstrating how consumer engagement directly influences the effectiveness of circular supply chains. While many studies focus on technological and organizational aspects of CE, this research shifts the emphasis toward behavioral dynamics, showing that consumer participation is indispensable in closing material loops.

First, the study reinforces the idea that circular supply chains are incomplete without active consumer involvement. Traditional supply chain theories have long considered end-users as passive actors, but CE models demand a reconceptualization where consumers play an active role in product life extension. Integrating behavioral economics into supply chain management research can provide deeper insights into how consumer actions (e.g., returning, recycling) affect overall sustainability outcomes.

Second, the study supports the application of psychological and behavioral models, such as the Theory of Planned Behavior (Ajzen, 1991), within circular business contexts. By identifying financial incentives, convenience, and sustainability awareness as key motivators, the research aligns with prior consumer behavior studies but contextualizes them within circular business ecosystems.

Third, it highlights the need for an interdisciplinary approach, where supply chain management, consumer psychology, and sustainability studies converge. Future research should explore consumer engagement in different cultural contexts, testing how societal values influence participation in CE initiatives.

For businesses, the findings underscore several strategies to optimize consumer involvement in circular supply chains. First of all, businesses should make circular participation more rewarding and seamless. Case studies show that financial incentives, such as vouchers or discounts, significantly increase consumer engagement. For example, IKEA's buy-back program provides economic motivation for customers to return used furniture, while Gruppo Calzedonia's voucher-based textile collection program effectively encourages participation. Companies should further explore tiered reward systems to incentivize frequent participation.

Moreover, logistical convenience remains a critical barrier. Many consumers hesitate to engage in take-back programs due to transportation challenges or perceived complexity. Businesses should simplify return processes through home pick-up services, digital resale platforms, and automated return kiosks in stores.

A major challenge in circular supply chains is consumer awareness. Many consumers are unaware of the benefits of CE or how their participation contributes to sustainability. Businesses should invest in educational campaigns, leveraging social media, influencer marketing, and interactive digital content to inform customers about circular initiatives.

Additionally, transparency in recycling and repurposing processes is crucial. Companies should publicly share data on the impact of their CE programs, demonstrating how returned products are reintegrated into production. This builds consumer trust, enhances participation, and increases transparency by providing detailed insights into post-collection processes, including how materials are sorted, reused, or repurposed. Additionally, integrating digital tracking tools, such as QR codes on take-back products that allow consumers to follow their item's journey, could reinforce consumer confidence and encourage long-term participation in circular initiatives.

Governments and regulatory bodies can accelerate consumer participation by implementing supportive policies. Businesses should advocate standardized CE regulations, such as extended producer responsibility (EPR) schemes that mandate corporate accountability for post-consumer waste. Tax incentives and subsidies for consumers participating in CE programs could further encourage sustainable behaviors.

Inter-industry collaboration is also essential. Shared infrastructure for material collection and processing can lower costs and improve efficiency. For example, the fashion industry could develop unified textile recycling networks, enabling different brands to share logistics for garment collection and reuse.

In this panorama, technology plays a crucial role in scaling CE initiatives. Businesses should leverage AI-driven consumer insights to personalize CE programs, targeting consumers with tailored incentives based on purchasing and return behaviors. Blockchain technology can enhance traceability in circular supply chains, providing verifiable records of product lifecycle stages and reassure consumers that their efforts contribute to real sustainability outcomes.

Additionally, digital resale platforms, like those being developed by IKEA, can facilitate peer-to-peer product exchanges, extending product lifecycles beyond business-controlled resale systems.

In conclusion, this study highlights the critical role of consumers in driving the success of CE initiatives and circular supply chains. While businesses have made significant strides in developing circular programs, fostering deeper consumer engagement remains a key challenge. Future research should continue exploring the intersection of consumer psychology, corporate strategy, and regulatory support to advance CE implementation on a larger scale.

Originality of the paper. *This study contributes to the literature by emphasizing consumer participation as a key element in circular economy (CE) initiatives and circular supply chains. Unlike prior research that primarily focuses on technological advancements and corporate sustainability strategies, this paper highlights the often-overlooked role of consumers in sustaining circular loops. A distinctive aspect of this research is its multi-sectoral approach, examining CE adoption in the furniture, cosmetics, and fashion industries. Each sector presents unique challenges in engaging consumers, from logistical barriers in furniture take-back programs to consumer reluctance in recycling cosmetic packaging and fashion waste. By comparing these sectors, this study offers a broader understanding of the mechanisms that influence consumer participation in CE initiatives.*

Furthermore, this research draws on behavioral economics (e.g., consumer responsiveness to incentives and effort minimization) and consumer psychology (e.g., perceived effort, trust, and sustainability attitudes) to interpret the

motivations behind participation in CE initiatives. These theoretical lenses helped frame the coding categories and guide the interpretation of patterns in consumer engagement across the cases. Unlike prior studies that assume rational consumer behavior in sustainability efforts, this paper acknowledges the complexities of consumer engagement, including barriers such as convenience perception, trust in recycling processes, and habitual purchasing behaviors.

From a methodological standpoint, the use of multiple case studies enhances the applicability of findings across industries. By selecting established global brands (IKEA, Sephora, and Gruppo Calzedonia), the research ensures that the results are relevant to a variety of business contexts, from multinational corporations to smaller enterprises aiming to implement circular models.

Moreover, this study highlights the potential of digital innovations in fostering consumer participation in CE. Emerging technologies such as blockchain for product traceability, AI-driven personalized sustainability recommendations, and online resale platforms are identified as promising tools for engaging consumers in circular business models. The role of digital transformation in CE adoption remains an underexplored area in existing literature, and this research sheds light on its potential impact.

Key words: *Circular economy, consumer behavior, sustainability, recycling, business models, case study.*

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Traceability in Circular Supply Chains: the role of digital technologies

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Abstract

Integrating circularity into supply chain management is imperative. Companies are increasingly expected to take proactive steps toward environmental sustainability. Issues such as resource waste, air pollution, and the use of non-recyclable materials are critical challenges in supply chain management. Supply chain mapping has emerged as a fundamental tool for tracking raw materials, waste production, emissions, and the overall sustainability performance. This study contributes to the literature on supply chain mapping, specifically within a stream of research that investigates product traceability from a circularity perspective. A central focus of this research is the technological advancements that enable product traceability, with a particular focus on emerging tools such as the Digital Product Passport (DPP), which is recognized as a key enabler of circular supply chains. Through a bibliometric literature review, this study aimed to explore these themes, advance the existing knowledge, and identify research gaps. The main findings revealed a predominant focus on upstream and midstream traceability, whereas research on downstream product tracking, particularly in the context of reuse and recycling, remains largely underdeveloped. Furthermore, the role of DPPs in post-production tracking, particularly in monitoring product components with a focus on recycling and reuse, remains an unexplored research avenue.

Framing of the research. *Given the increasing intricacy and geographical diversification of supply chain networks, supply chain mapping has become imperative for ensuring visibility, traceability, and sustainability (Mubarik et al., 2021). Research has demonstrated that a lack of visibility within supply networks hinders the exchange of critical information, impeding the ability to respond promptly to sudden disruptions (Ali et al., 2022; Mubarik & Khan, 2024). This issue was exemplified during the global pandemic caused by COVID-19.*

Mubarik et al. (2021) defined supply chain mapping as an organization's capability to trace its upstream, downstream, and process value chains using advanced digital technologies. This approach is crucial for ensuring operational sustainability and providing comprehensive visibility to suppliers and customers throughout the network. Such visibility enables the identification of potential bottlenecks and enhances decision-making within the supply chain (Pengzhong Li, 2011). Conversely, inadequate mapping can undermine business sustainability and negatively impact strategic competitiveness and organizational reputation (Khan, 2022).

Supply chain mapping is linked to three concepts: visibility, transparency, and traceability. All these concepts have emerged as interrelated, and are often used complementary and sometimes wrongly synonymous (Sodhi & Tang, 2019; Budler et al., 2024).

To understand this disclosure better, it is good to visualize the differences between these concepts. Supply chain mapping is a graphic representation of all flows of materials, information, and financial resources throughout the supply network, beyond the first tier of suppliers (Wilhelm et al., 2016; Barroso et al.,2011). Visibility, enabled by supply chain mapping, is the capability for firms to see across their supply chains, in other words, to access accurate, timely, and relevant information across SC. Once visibility is achieved, firms can decide whether or how to disclose this information to external stakeholders. Transparency is the extensive disclosure of information regarding supply chain operations, product origins, and cost structures to a broad range of stakeholders, and implies an openness that extends beyond the supply chain (Sunny et al., 2020).

Traceability refers to the ability to track the history, application, and location of products, components, and materials throughout every stage of the supply chain in real time (ISO, 9000/BS 5750) (Budler et al., 2024; McGrath et al., 2021).

In summary, these four concepts are not only distinct but also mutually reinforcing: mapping lays the groundwork for visibility, visibility enables transparency, and traceability provides the data infrastructure necessary to ensure both visible and transparent supply chains.

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This research focuses on traceability despite the importance of noticing the interconnection of these concepts.

The rapid advancement of digital technologies (DT), including Artificial Intelligence (AI), pervasive computing, digital twins, 5G, augmented reality (AR), virtual reality (VR), advanced analytics, and blockchain technologies, has transformed the configuration, coordination, and management of supply chains (Di Paola et al., 2023; Mubarik & Khan, 2024). In this context, these technologies have emerged as enablers of product traceability along global supply chains, facilitating the real-time monitoring of materials, products, and transactions, supporting the accurate mapping of supply chain activities, and providing organizations with insights into the origin of each product component (Mubarik & Khan, 2024). This capability allows companies to track energy and material consumption at each supply chain stage and manage reverse flows including disposal, recycling, and waste management (Dahlmann & Bulck, 2020). This capability stems from two key technological functions: enhancing collaboration and facilitating information exchanges. These functions enable companies to make informed decisions, support sustainable management strategies, and reduce uncertainty by preventing potentially harmful environmental issues (Ranasinghe et al., 2024).

Given the increasing frequency of extreme climate crises, the urgency to adopt sustainable practices has intensified, thereby highlighting the role of supply chain mapping in mitigating adverse socio-environmental impacts (Kusi-Sarpong et al., 2019). In this context, supply chain mapping is recognized as critical for achieving sustainability because it enables detailed tracking of the flow of goods and services, facilitating the identification and reduction of waste in business processes (Mubarik, 2023). In doing so, advanced technologies are essential to ensure compliance with environmental and social standards (Khan et al. 2022), as well as to support the adoption of green technologies, waste reduction through operational efficiency, and the implementation of recycling and upcycling practices.

The concept of a circular supply chain has recently emerged as an innovative approach that integrates sustainability principles with the potential for digitalization. Implementing circularity is essential in the current global economic landscape, where only 7.2% of secondary materials are consumed by the global economy, resulting in a significant loss of raw materials that can otherwise be reused, thus enhancing environmental and economic sustainability. This also shows a decline in global circularity that had a 21% drop in five years, while in the same time frame, the total amount of materials consumed by the global economy has reached 582 billion tons of materials (Circle Economy, 2024). Supply chain traceability is crucial for proactively tracking resource loss and facilitating reuse, recycling, or disposal.

Emerging technologies, particularly blockchains, play a pivotal role in promoting circular economy practices by enabling highly traceable and transparent supply chains (Oguntegbe et al., 2021). By integrating advanced technologies such as RFID and GPS, blockchain effectively addresses the challenges related to environmental, financial, and social sustainability. It allows comprehensive monitoring of product life cycles, from raw materials to finished goods, and subsequent recycling stages. Consequently, adopting blockchain in circular supply chains represents a strategic step toward enhanced sustainability by optimizing resource use and ensuring unique transparency in the value chain (Centobelli et al., 2022). However, achieving effective traceability across the entire supply chain remains challenging owing to the complexity of global supply networks and extensive product flows.

Digital Product Passport (DPP) has emerged as a key tool within the framework of circular economic initiatives related to supply chain mapping. DPP is an electronic tool designed to record, process, and share product information across supply chains, government agencies, consumers, and waste management sectors. Its primary objective is to digitalize and modernize product data, facilitating industrial transition toward circularity and carbon neutrality (Koppelaar et al., 2023). This tool exemplifies how tracking products, components, and raw materials throughout the supply chain, from sourcing to end products, can support sustainable business decisions and optimize product recovery and reuse before they become waste (European Commission, 2024).

The DPP is part of the regulation approved by the European Union in April 2024 under the Eco-Design for Sustainable Products Regulation (ESPR), aligned with the European Green Deal. This regulation aims to enhance transparency across the entire product value chain by providing comprehensive information about product origins, materials, environmental impacts, and disposal recommendations (European Commission, 2024). Currently, several DPP variants are tailored to different products and purposes. The mandatory implementation began with industrial batteries and electric vehicles in January 2026, followed by expansion to other product categories. Although the DPP's adoption is still in its early stages, it is rapidly accelerating owing to the European Commission's political support (Zhang & Seuring, 2024). This digitalization initiative is expected to play a crucial role in driving circularity, transparency, and sustainability across global supply chains.

Purpose of the paper. *The primary objective of this study is to enhance the discourse on supply chain circularity by conducting an in-depth examination of the relationship between circularity and traceability, with particular emphasis on the technologies that enable such tracking. This review aims to support circularity studies by integrating the emerging discussion on digital product passports (DPP), which has gained prominence in recent years. The decision to undertake a systematic literature review stems from the limited methodological rigor observed in articles addressing these emerging topics in order to identify research gaps and delineate the principal thematic clusters associated with these subjects. Moreover, most of the literature on this topic does not explicitly focus on tracking capabilities but rather addresses broader themes related to transparency and visibility, often overlooking the specific contribution of these capabilities to enabling circularity and focusing on the tracking capability to achieve transparency in supply chains (Sunny et al., 2020; Duan et al., 2019; Sodhi et al., 2019; Montecchi et al., 2021).*

Methodology. *This study adopts a systematic literature review (SLR) to identify the state of the art and critically outlines future research directions. This systematic literature review addresses two research questions:*

RQ1. What are the key research themes and emerging research areas related to product or component traceability for improving supply chain circularity?

RQ2. What are the main research trends and thematic clusters related to circularity and traceability relationships?

This method allows for a systematic, transparent, and reproducible analysis of academic papers on a specific topic, minimizing biases and leading to reliable conclusions. To conduct a systematic literature review, an appropriate query was formulated to investigate the subject of interest thoroughly. The search terms were tested to refine the most suitable query. Adjustments were made before finalizing the sample selection by evaluating the search terms and inclusion criteria on a preliminary dataset (Snyder, 2019). The final query resulted from a deliberate selection process and multiple iterations, which helped identify the most relevant terms and avoid deviation from the core research topic. This review focuses on the relationship between product traceability through the supply chain with different technologies (such as blockchain, digital twins, and AI) and supply chain sustainability or circularity. After several tests, we decided to focus on circular supply chains (CSC) with a focus on products' end-of-life management. Since this study specifically examines the application of different traceability technologies, several terms related to Industry 4.0, were included in the query.

The final query was:

Query: ((("passport" AND ("digital" OR "product*" OR " material*" OR "battery" OR "building*" OR "recycling" OR "resource*")) OR ("traceability" AND ("product*" OR "component*" OR "supply chain" OR "resource*")) OR "product map*" OR "resource map*"))AND ("supply chain" AND ("circular*" OR "sustainab*" OR "closed-loop" OR "reverse" OR "remanufactur*" OR "reus*" OR "recycl*" OR "eco-design" OR "product lifecycle" OR "end-of-life management" OR "waste management" OR "resource efficiency" OR "material recovery" OR "remanufacturing" OR "refurbish*" OR "upcycl*" OR "downcycl*" OR "waste valorization" OR "secondary raw materials" OR "zero waste" OR "carbon neutral" OR "carbon footprint" OR "industrial symbiosis")) AND ("blockchain" OR "digital twin" OR "RFID" OR "IoT" OR "Internet of Things" OR "sensor technology" OR "big data" OR "artificial intelligence" OR "machine learning" OR "data analytics" OR "cloud computing" OR "smart contract" OR "distributed ledger")*

The search was conducted using Web of Science (WoS) and Scopus databases, yielding initial results of 532 and 749 documents, respectively. These preliminary results were obtained without applying a filter. All articles that contained defined query terms in their keywords, titles, and abstracts were included. Subsequently, the inclusion and exclusion criteria were set to determine the final sample.

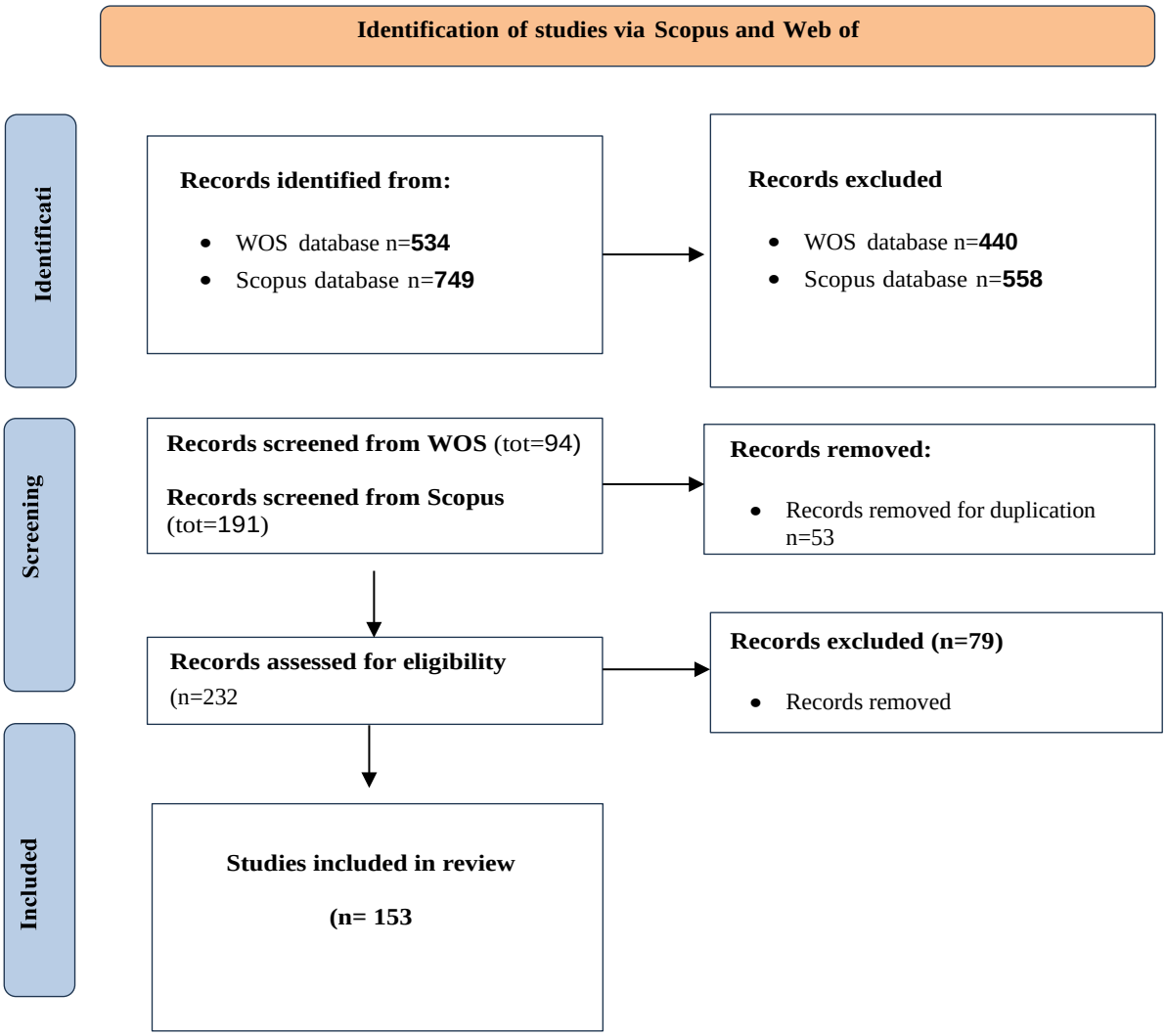
The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Figure 1) was used to define the selection process (Moher et al., 2009). Three basic filters were utilized to identify pertinent manuscripts: (1) selection was restricted to papers authored in English; (2) inclusion was limited to papers classified within the domains of business, management, and economics in WOS, and business, management, and accounting in Scopus, as this corresponds to the focus of the study; and review articles were excluded to prevent potential adverse effects on the research outcomes. A language filter was applied to avoid interpretative biases resulting from limited proficiency in other languages, and because English is an international language for academic papers. Applying these inclusion criteria, 440 papers from the WoS and 558 from Scopus were excluded, reducing the dataset to 287 papers. Then, 53 duplicates were removed using the bibliometrix software.

The second step was screening the initial sample based on abstract reading to assess their alignment with the research topic. This process excluded 79 studies that did not meet the inclusion criteria. Papers that did not focus on the research topics were excluded. Specifically, papers that discussed traceability without making a direct link to circularity achieved through these practices, or conversely, those that concentrated on specific supply chain sustainability practices without addressing tracking mechanisms, were excluded. Bibliometric review papers were excluded because they were not aligned with the objectives of this study and would have distorted the results. Consequently, 153 papers were included in the review, meeting the inclusion criteria and addressing the research topics. A preliminary analysis of these papers was conducted using bibliometric software to set the final sample for a deeper analysis that involved a complete reading of the papers and further bibliometric analysis to better address the research questions at the core of this analysis.

From 2003 to 2025, the average annual growth rate of the published papers was 9.25%. Notably, 2024 saw a significant increase in the number of published papers compared with previous years. According to the analysis of the first 100 articles using bibliometrix, an average of 8 papers were published annually from 2003 to 2022. This figure jumped to 34 papers by 2023 and 54 papers by 2024, reflecting a marked increase in the interest in these topics.

The top ten keywords identified were blockchain, sustainability, traceability, supply chain, blockchain technology, circular economy, supply chain management, transparency, food supply chain, and the Internet of Things. This reflects the main thematic clusters on which the papers included in the review were focused.

Figure: the prisma model



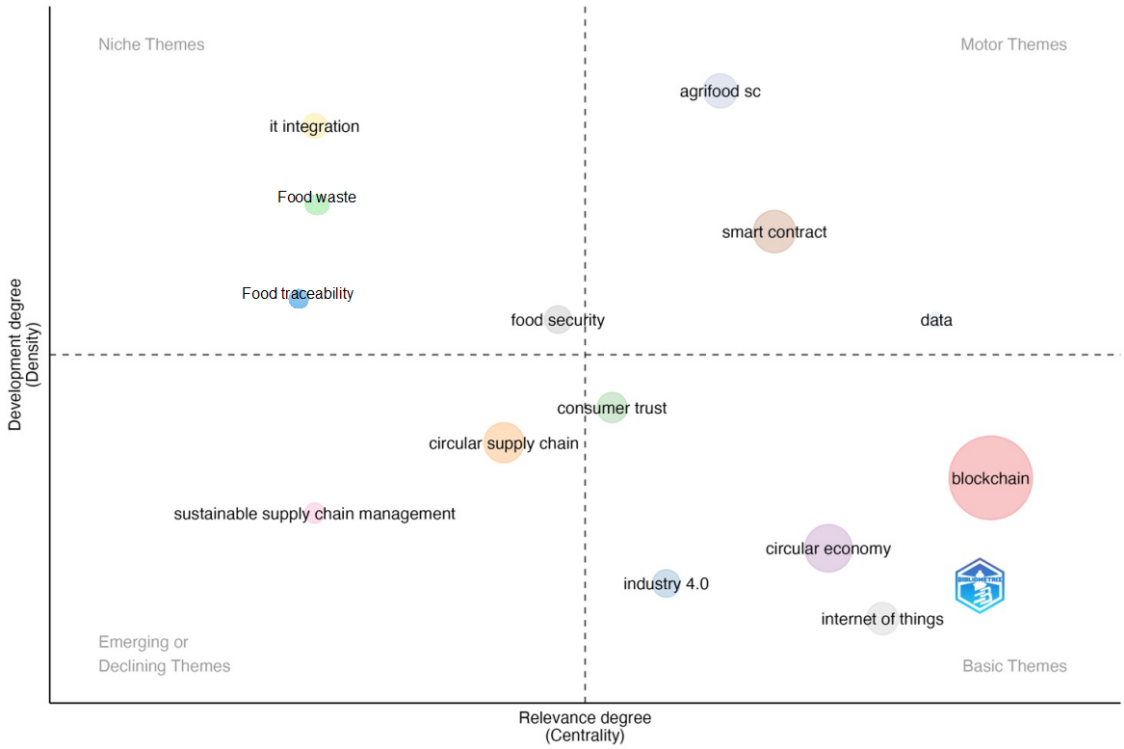
Source: authors' elaboration.

Results. *This systematic literature review provides a comprehensive overview of how the topic of traceability, aimed at achieving circularity, has been addressed in the existing research. This study contributes to the theoretical advancement of this field by identifying directions for future research. The intermediate results obtained from this preliminary analysis to answer the research questions are summarized below.*

To address the first research question, the abstracts were analyzed, and a thematic map (Figure 2) was generated using the Bibliometrix software. This analysis facilitated the identification of the main research themes. The main research themes in product and component traceability focus on attaining circularity in the supply chain, predominantly centered on the utilization of blockchain technology that appear in the basic themes quadrant (bottom right). Blockchain has emerged as a central tool for traceability, playing a critical role in enhancing transparency and accountability in supply chains, particularly with respect to circularity initiatives. The second prominent theme focuses on the food supply chain (upper right) where multiple studies have explored the traceability of food products as a means of reducing food waste and increasing consumer trust that are in the niche themes quadrant that includes well-structured themes but peripheral to the broader research field. The third key research area addresses the barriers faced by companies in adopting various traceability technologies, highlighting the challenges in the implementation of efficient tracking systems. Additionally, two emerging research areas (situated in the emerging or declining themes quadrant) related to traceability for achieving supply chain circularity have been identified: the use of tools such as digital product passports (DPP), which, although still underexplored, is identified as a promising approach, particularly for downstream mapping. Even though consumer trust is a traditional theme, it appears as an emergent theme in this field. Costumer trust in sustainable, recycled, or upcycled products has surfaced as a relevant theme, with traceability seen as a vital mechanism for enhancing consumer confidence in such products.

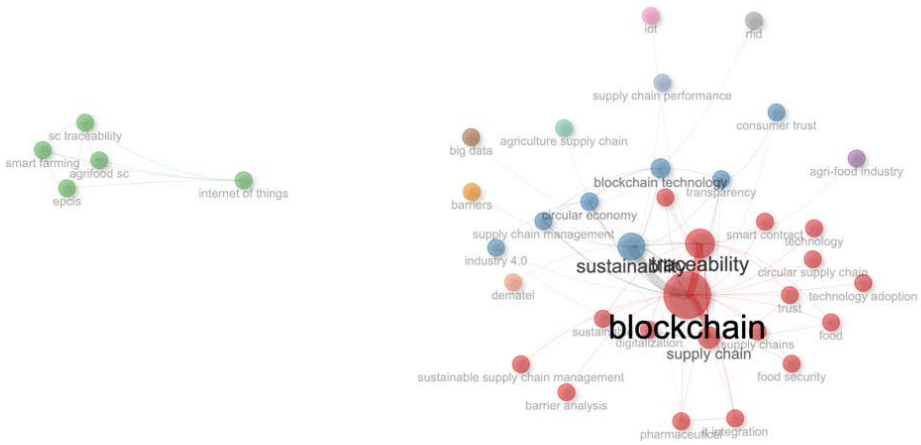
Notably, themes such as consumer trust, food traceability, and food security appear near the center of the map, suggesting their transitional nature and bridging role between technological and sustainability-focused discussions.

Figure 2 Thematic map



To address the second research question, a co-occurrence network (Figure 3) was created. It reveals two distinct thematic clusters, shedding light on the key research areas linking blockchain, traceability, and circular supply chain.

Figure 3 co-occurrence network



The first and most prominent cluster centers on blockchain technology and its role in supply chain traceability. Keywords such as "traceability," "sustainability," "digitalization" and "supply chains" are strongly interconnected, emphasizing how blockchain facilitates transparency, smart contracts, and technological adoption. In addition, key subtopics such as food security and pharmaceutical supply chains have emerged, indicating the application of blockchain-based traceability across various industries (Oguntegbe et al., 2022). This cluster highlights the dominant research focus on using blockchain to enhance pre-production and in-production traceability and ensure supply chain efficiency and compliance.

In this cluster, most studies primarily focus on impacts such as CO2 emissions, resource waste, and the exchange of information to reduce information asymmetries and achieve greater efficiency (Enayati et al., 2024; Zakaria et al., 2023)). Second, a smaller number of studies have focused on the issue of trust and the role of the consumer in achieving circularity. (Centobelli and al., 2022; Niu et al., 2022; Balzarova et al., 2022).

The second cluster is centered on sustainability, circular economy, and supply chain management. Key terms such as "circular economy," "supply chain management," "industry 4.0," and "barriers" indicate that this research stream explores the challenges and strategic implications of integrating circularity into supply chains. Topics like "transparency" and "blockchain technology" suggest that blockchain is also investigated as an enabler of sustainable supply chain practices.

A thematic analysis of the abstracts reveals that most studies focus on pre-production traceability (upstream and midstream), where circularity is integrated with supply chain efficiency, from raw material sourcing to product manufacturing and service delivery. By contrast, post-production traceability (downstream), which involves tracking products for reuse or recycling, remains an emerging and underdeveloped research area. Additionally, existing studies are largely concentrated on specific sectors, primarily the agri-food industry, with limited research applicable to other industries. The analysis shows that the contribution of Digital Product Passports (DPP) as a tool for companies, not only during production but also post-production, for tracking product components with a focus on recycling or reuse, remains underexplored. Product end-of-life remains an emerging area within the contribution of traceability to circularity.

Research limitations. *A key limitation of this literature review is the selection of sources, as the choice of databases (Web of Science and Scopus) and inclusion/exclusion criteria may have influenced the completeness of the analysis. Furthermore, academic literature may neglect practical approaches or emerging innovations that have not yet been documented in academic research. The decision to exclude so-called "grey literature" enhances the replicability and rigor of the study; however, it also restricts the diversity and flexibility of the findings (Adams et al., 2017). The inclusion of studies published in non-academic outlets accounts for emerging trends, whereas academic findings may not yet be evident because of the lengthy publication process (Rojon et al., 2021). Another limitation could be the choice to focus only on traceability and not on transparency or visibility in the query used, although these concepts often recur in research. The aim of this choice was to concentrate the analysis only on this topic and its peculiarity; however, this could limit the selection of papers included in the review.*

Managerial implications. *This study has several practical implications for the traceability and circularity of products. Given the increasing relevance of contributing to the circular economy, it has become essential to understand how proactive measures can be taken to achieve this, particularly by identifying technologies that can support its implementation. The findings of this study may offer managers a more structured perspective on the importance of traceability along the supply chain, and how it actively contributes to the reuse and recycling of materials throughout the entire supply network. Various technologies have enhanced traceability and led to the development of different tools that facilitate tracking, benefiting both managers and end consumers. These tools not only improve sustainability but also enhance supply chain resilience by fostering transparency, strengthening trust among stakeholders, and enabling the identification of bottlenecks and unsustainable processes (Khan et al., 2022). Among the emerging tools, Digital Product Passport (DPP) is gaining prominence, as it enables managers to access comprehensive information about product components, thereby supporting the circularity of the entire supply chain. This study explores how managers can leverage the DPP, assess its actual impact on circularity, and identify potential barriers to its implementation.*

Originality of the paper. *Despite the growing interest in circular supply chains, few literature reviews have comprehensively explored the relationship between product traceability and circular economy. Existing studies often focus on specific technologies, such as blockchain, or examine traceability within individual industries, without providing a broader perspective on how different tracking technologies contribute to circularity. Moreover, the role of digital product passports (DPP) in enabling circular supply chains remains largely underexplored in literature reviews. Most existing studies either discuss the concepts, challenges, and opportunities of DPP implementation, analyze its definitions and theoretical foundations, or examine case studies on how the DPP supports sustainable and circular practices (Munaro e Tavares,2021; Walden e al., 2021; Zhan et. Al.,2024).*

This review aims to bridge this gap by systematically analyzing the various technologies used for tracking product components along the supply chain and assessing their role in achieving circularity. By integrating insights into tools such as DPP, this study provides a more comprehensive understanding of product traceability as a key enabler of circular supply chains, and identifies critical gaps in the existing literature.

Key words: *supply chain, traceability, blockchain, Digital product passport, supply chain mapping, product traceability*

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Transizione circolare nella gestione dei rifiuti tessili nell'Unione Europea. Barriere sistemiche ed opportunità strategiche

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Abstract

L'Unione Europea sta affrontando un momento critico di transizione verso una gestione circolare dei rifiuti tessili, spinta da crescenti preoccupazioni ambientali, l'attuazione di rigorose normative quali la Responsabilità Estesa del Produttore (EPR) e il Regolamento sull' Ecodesign dei Prodotti Sostenibili (ESPR). Questo studio esplora ostacoli e opportunità nell'ecosistema della gestione dei rifiuti tessili nell'UE attraverso un'approfondita revisione della letteratura e interviste semi-strutturate con stakeholder lungo tutta la filiera del rifiuto tessile. Sono identificati dodici ostacoli ad una gestione efficace dei rifiuti tessili, categorizzati in quattro temi principali, ma anche nove opportunità di sviluppo, anch'esse raggruppate in quattro temi. I risultati sottolineano la necessità di un approccio sistemico e multi-stakeholder per guidare il settore tessile europeo verso la circolarità. Fornendo indicazioni operative e raccomandazioni pratiche, questa ricerca contribuisce al dibattito più ampio sulle pratiche di economia circolare nel settore tessile e offre una roadmap per permettere agli stakeholder di navigare tra le complessità di questa transizione.

Framing of the research. *L'industria tessile è tra i principali responsabili del degrado ambientale globale (EEA, 2014; EEA, 2019). Nel corso del tempo, la produzione e il consumo di prodotti tessili è cresciuto considerevolmente, accompagnato dal corrispondente aumento della generazione di rifiuti (Ütebay et al., 2019; EEA, 2024). L'esportazione di questi rifiuti a paesi extra-UE è triplicata, soprattutto a causa di un'infrastruttura comunitaria insufficiente per il riutilizzo e il riciclo (EEA, 2024; Watson et al., 2020).*

Riconoscendo questi effetti negativi, le Nazioni Unite hanno incluso l'industria tessile tra gli Obiettivi di Sviluppo Sostenibile (SDG), con l'intento di migliorare le pratiche industriali attraverso l'innovazione e l'incoraggiamento di un consumo sostenibile (UN, 2015). Nel 2022, la Commissione Europea ha introdotto la Strategia dell'UE per il tessile sostenibile e circolare nell'ambito del Piano d'Azione per l'Economia Circolare (CEAP) del Green Deal. Questa strategia prevede una trasformazione dell'industria tessile entro il 2030, garantendo che tutti i prodotti tessili venduti nell'UE siano durevoli, riciclabili, privi di sostanze tossiche e realizzati in modo sostenibile (European Commision, 2022). Ulteriori iniziative intraprese comprendono il Regolamento sull'Ecodesign dei Prodotti Sostenibili (ESPR), che stabilirà norme obbligatorie per la riparabilità e la durabilità dei prodotti tessili e regole più severe per scoraggiare o proibire la distruzione di capi invenduti, oltre a nuovi criteri per le dichiarazioni ambientali, e l'obbligo del Digital Product Passport (DPP), l'identità digitale di ogni singolo capo d'abbigliamento commercializzato in Europa.

Mentre i governi e gli organismi sovranazionali spingono la transizione verso un'economia circolare attraverso legislazioni e direttive top-down, sono essenziali anche maggiori sforzi bottom-up da parte delle realtà industriali (Bressanelli et al., 2019). A livello di supply chain, la configurazione della supply chain a ciclo chiuso (Closed-loop SC) consiste nella progettazione, controllo e gestione di un sistema che massimizzi la creazione di valore durante l'intero ciclo di vita del prodotto (Govindan et al., 2015). Tale processo implica la gestione efficace ed efficiente di una serie di attività volte a recuperare il valore dai prodotti che percorrono un flusso inverso. Un'attività centrale nella supply chain a ciclo chiuso è la Logistica Inversa (RL), definita come "Il processo di pianificazione, implementazione e controllo del flusso efficiente ed economico di materie prime, scorte in lavorazione, prodotti finiti e relative informazioni dal punto di consumo al punto d'origine per recuperare valore o smaltire correttamente" (Rogers & Tibben-Lembke, 1999, p.2). L'obiettivo fondamentale della RL è recuperare e, se possibile, creare valore dalla gestione di questo flusso inverso, sia attraverso operazioni di riprocessamento che attraverso lo smaltimento diretto e indiretto dei materiali.

Secondo Hazen et al. (2012), in relazione al potenziale valore residuo recuperabile da un'azienda, le alternative spaziano da: (1) riuso e rivendita; (2) ricondizionamento del prodotto; (3) recupero o riciclo dei materiali; (4) smaltimento.

I rifiuti tessili sono solitamente classificati in due gruppi in base a quando vengono generati: pre-consumo e post-consumo. I rifiuti pre-consumo sono materiali scartati prima di raggiungere i consumatori, generati tipicamente durante i processi produttivi, come scarti, sfridi e articoli invenduti o resi. I rifiuti post-consumo comprendono tessili e

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abbigliamento usati e poi scartati dai consumatori a causa di danni, usura o cambiamenti nelle tendenze della moda. Il riciclo tessile si riferisce prevalentemente al riprocessamento dei rifiuti tessili pre- o post-consumo per utilizzarli in nuovi prodotti tessili o non tessili (Sandin & Peters, 2018). Le modalità di riciclo tessile sono tipicamente classificate come meccaniche, chimiche o termiche. Gli output di riciclo tessile includono soluzioni open-loop come fibre per isolamento, riempimento o tessuti non-tessuti per il settore automobilistico e altre industrie, nonché il riciclo da fibra a fibra. I flussi non raccolti separatamente e non selezionati per riuso o riciclo sono destinati alla termovalorizzazione o in discarica (Solis et al., 2024).

Purpose of the paper. *Nonostante sia stato suggerito alle aziende di trasformare il proprio modello da economia lineare a circolare, molte barriere ostacolano questa transizione. Galvão et al. (2018) identificano sette barriere: tecnologiche, politiche e regolatorie, finanziarie ed economiche, manageriali, indicatori di performance, relative al cliente e sociali. Nel settore tessile, Rathinamoorthy et al. (2019) includono a queste barriere una resistenza culturale al cambiamento, limitazioni tecnologiche, sfide di mercato e vincoli imposti da regolamenti governativi. Kumar e Suganya (2019) includono infrastrutture inadeguate per raccolta e selezione dei rifiuti, politiche insufficienti, bassa consapevolezza dei consumatori e resistenza al cambiamento.*

Più recentemente, Kazancoglu et al. (2024) identificano nove barriere principali alla transizione circolare nel tessile: management e decision-making, organizzazione del lavoro, sfide di design, materiali, norme e regolamenti, mancanza di conoscenza, assenza di integrazione e collaborazione, costi e investimenti in infrastrutture tecnologiche. Nonostante il valore di questi risultati, il framework è stato sviluppato nel contesto turco, limitandone la generalizzabilità al contesto europeo, che sta attraversando una profonda trasformazione.

Sorgono infatti interrogativi circa l'efficacia degli interventi politici nel migliorare la gestione dei rifiuti tessili in Europa, e l'incremento dei flussi nella raccolta dei rifiuti che questi interventi porteranno necessiterà di investimenti significativi per potenziare le capacità di raccolta, selezione, riutilizzo e riciclo dei rifiuti tessili. Le strategie attuali si concentrano principalmente sul riciclo a circuito aperto, ma occorre sviluppare approcci complementari per una gestione sostenibile dei rifiuti post-raccolta (McKinsey & Company, 2022; Solis et al., 2024). Comprendere gli ostacoli e i fattori abilitanti per la transizione verso un'economia circolare in diversi contesti può supportare lo sviluppo di strategie mirate per il riciclo tessile sostenibile e pratiche di moda circolare (Abagnato et al., 2024; Charnley et al., 2024; Hartley et al., 2022).

Questo studio punta a colmare il divario di conoscenze, esplorando interdipendenze e fattori contestuali che influenzano tali barriere attraverso geografie, ambienti normativi e livelli di sviluppo industriale differenti. La domanda centrale di questa ricerca è:

RQ: Quali sono gli ostacoli alla gestione efficace dei rifiuti tessili in Unione Europea?

Methodology. *Alla luce delle lacune individuate nella letteratura esistente e del panorama normativo in rapida evoluzione, questo studio si pone i seguenti obiettivi:*

Valutare le sfide che gli attori dell'ecosistema del rifiuto tessile affrontano nell'adattarsi ai futuri requisiti normativi.

Esplorare le potenziali opportunità di sviluppo all'interno del settore.

Fornire raccomandazioni operative per gli stakeholder dell'ecosistema.

Dopo una prima fase di revisione della letteratura e di studio della normativa UE, le interviste semi-strutturate sono state selezionate come metodo efficace per la raccolta dei dati necessari a rispondere alla domanda di ricerca. Le interviste hanno coinvolto operatori lungo l'intera filiera tessile per ottenere approfondimenti sulle sfide strutturali, infrastrutturali e sistemiche, nonché sugli incentivi necessari per ampliare i sistemi di gestione dei rifiuti. Lo studio si è concentrato sul territorio dell'Unione Europea in quanto oggetto di una transizione normativa volta a promuovere un sistema tessile circolare (Kirchherr et al., 2018). I partecipanti sono stati accuratamente selezionati per il loro coinvolgimento nelle tecnologie o infrastrutture di gestione dei rifiuti nel mercato europeo, rappresentando varie fasi della catena del valore circolare. Nonostante il campione relativamente ridotto, le interviste hanno prodotto dati qualitativi ricchi, sfumati e dettagliati. Gli intervistati erano professionisti senior con una notevole esperienza e coinvolgimento in iniziative di economia circolare tessile. Le interviste sono state condotte da Dicembre 2024 a Febbraio 2025, registrate, trascritte e analizzate sistematicamente. La Tabella 1 delinea i profili dei nove partecipanti, descrivendo le tipologie organizzative, le zone geografiche di riferimento e i ruoli aziendali attuali. I partecipanti includevano rappresentanti di organizzazioni umanitarie, fornitori di tecnologie digitali, marchi globali della moda e consorzi per la gestione dei rifiuti tessili, ciascuno contribuendo a diversi aspetti della gestione dei rifiuti tessili.

Tab. 1: Partecipanti delle interviste - tipo di organizzazione, area geografica di operatività e ruolo dell'intervistato

#	Tipo di Azienda	Zona geografica	Ruolo dell'intervistato
1	Charity Collector for Resale & Recycle	Multinational	Marketing & Communication Manager
2	Charity Collector for Resale & Recycle	Multinational	CSR Manager & Corporate Partnership
3	Digital Technology Provider for Recycling & Repairing	Italy	Chief Marketing Officer
4	Digital Technology Provider for Traceability	France	Traceability Specialist
5	Digital Technology Provider for Traceability & Compliance Consultancy	Netherland	Head of Marketing
6	Global Brand	Multinational	Sustainability Specialist
7	Textile Waste Consortium	Italy	Textile Business Development Manager
8	Reverse Logistic Provider & Repairing	Italy	Sales Manager
9	Digital Technology Provider for Renting & Resale	Multinational	Founder & Chief Operating Officer

Gli argomenti affrontati nelle interviste hanno riguardato le operazioni aziendali, i processi di selezione dei rifiuti, la logistica, le partnership e l'adeguamento alle imminenti normative. L'analisi tematica è stata utilizzata come approccio migliore per analizzare i dati qualitativi raccolti in modo flessibile e sistematico (Clarke et al., 2013). L'analisi è iniziata con una fase di familiarizzazione con le trascrizioni delle interviste per identificare gli argomenti principali, seguita da un processo iterativo per individuare temi e relazioni all'interno dei dati. Attraverso questo processo sono state individuate 12 barriere, raggruppate in quattro categorie principali, e 9 opportunità suddivise in quattro temi.

Results. I *dati codificati sono stati suddivisi in quattro temi principali relativi agli ostacoli nella gestione dei rifiuti tessili e quattro opportunità di sviluppo, che sono presentati nell'analisi.*

Sfide nella gestione dei rifiuti tessili

1. Complessità normative

Frammentazione e mancato allineamento normativo tra Stati

Sebbene le normative EPR ed ESPR siano pensate per distribuire equamente le responsabilità della gestione dei rifiuti tra gli stakeholder, la loro implementazione frammentata tra gli Stati membri dell'UE crea oneri amministrativi e operativi per le aziende multinazionali, che devono affrontare standard divergenti e ciò causa inefficienze. Inoltre, la mancanza di una politica armonizzata a livello europeo aggrava i costi di conformità. Ad esempio, alcuni stati membri potrebbero ritardare o applicare in maniera inadeguata le direttive, generando incertezza per le aziende multinazionali. Tale disallineamento aumenta non solo il carico amministrativo ma disincentiva anche l'innovazione verso soluzioni circolari, poiché i marchi danno priorità alla conformità di base piuttosto che alla sostenibilità strategica.

Pratiche elusive

Le legislazioni che vietano pratiche insostenibili come la distruzione dei beni invenduti vengono aggirate da alcuni operatori con diverse soluzioni (ad esempio, rimozione delle etichette, smontaggio dei prodotti per il riciclo meccanico e esportazione all'estero). Le leggi si concentrano spesso su misure punitive piuttosto che su incentivi proattivi, non affrontando le ragioni per cui i brand preferiscono la distruzione al riuso. Tali scappatoie indeboliscono l'intento legislativo, perpetuando un ciclo in cui i rifiuti vengono occultati invece che valorizzati.

DPP come opportunità mancata

Nonostante il suo potenziale per migliorare trasparenza e tracciabilità, il DPP non è ancora percepito come uno strumento utile. Molti brand lo adottano in maniera reattiva per rispondere ai requisiti normativi piuttosto che integrarlo strategicamente nelle operazioni circolari. Questo riflette una sfida più ampia, in cui spesso i brand non hanno la capacità interna di elaborare e utilizzare strategicamente i dati dettagliati forniti dal DPP.

2. Limitazioni infrastrutturali e tecnologiche

Infrastruttura del riciclo sottosviluppata

L'infrastruttura europea del riciclo non è preparata per l'aumento imminente dei volumi di rifiuti tessili guidati dalle leggi sull'EPR. Gran parte delle strutture esistenti nell'UE sono ottimizzate per il downcycling, limitando il riciclo di alto valore. Gli investimenti in tecnologie di riciclo avanzate (ad es., riciclo chimico) sono stati sporadici, limitati a progetti pilota. La dipendenza dal downcycling perpetua un modello "lineare dentro circolare", in cui i rifiuti vengono deviati dalle discariche solo per perdere il loro valore materiale.

Mancanza di integrazione nei sistemi di selezione e separazione dei rifiuti e complessità dei materiali

I sistemi di selezione rimangono prevalentemente manuali o semi-automatizzati, risultando inefficienti e soggetti a errori. Questo problema è aggravato dalla presenza di fibre miste difficili da separare senza macchinari avanzati. Inoltre, le fibre miste e la bassa qualità dei capi provenienti dal fast fashion rendono tecnicamente ed economicamente difficile la selezione. Il riciclo fibra-fibra è economicamente fattibile per fibre di alto valore come cashmere, lana o poliestere poco mischiato con altre fibre derivate da plastica. Tuttavia, i nuovi materiali riciclati spesso superano il prezzo delle materie prime vergini, rendendo economicamente svantaggioso il loro utilizzo.

Over dipendenza dalle esportazioni

La dipendenza dai mercati asiatici per il riciclo evidenzia la fragilità economica e l'insostenibilità ambientale del sistema europeo. Le strutture europee non riescono a gestire la varietà dei flussi tessili, creando un collo di bottiglia.

3. Barriere economiche e operative

Alti costi delle soluzioni circolari

L'onere finanziario derivante dall'implementazione della logistica inversa, del riciclo e dei servizi di riparazione rende difficile scalare queste soluzioni. I costi di tali operazioni spesso superano quelli per la produzione di capi nuovi.

Complessità logistica

Gestire programmi di recupero e rifiuti post-consumo richiede significativi investimenti nella logistica inversa, che molti brand trovano dispendiosi in termini di risorse. Nella fase attuale, oltre a sporadici programmi di ritiro sviluppati da marchi di moda o rivenditori, la stragrande maggioranza dei rifiuti tessili post-consumo viene raccolta da aziende autorizzate che pagano le municipalità per la raccolta. Una volta raccolti, i rifiuti vengono spostati in centri di smistamento, che raramente sono gestiti da un singolo operatore, rendendo le operazioni logistiche ulteriormente frammentate e costose, senza alcun supporto finanziario.

Frammentazione lungo la catena del valore

Gli attori della filiera operano spesso in compartimenti stagni, generando inefficienze e ridondanze. Tale mancanza di collaborazione ostacola lo sviluppo di sistemi circolari coesi.

Inefficienze di mercato

L'eccesso di fibre riciclate di bassa qualità non trova un mercato di sbocco, causando saturazione e ulteriori costi di smaltimento. Questo deriva dalla sovrapproduzione di tessili a bassa qualità e durabilità, inadatti al riciclo di alta qualità. La sovrapproduzione di fibre riciclate di bassa qualità inonda i mercati di sbocco, soprattutto per usi come l'isolamento, che non riesce ad assorbire l'eccesso di offerta. Inoltre, considerando le fibre riciclate di bassa qualità, i marchi che non vogliono riprendere tali materiali, vedono il riciclaggio come un modo per smaltire i rifiuti, non riuscendo a implementare pratiche a ciclo chiuso.

4. Percezioni dei cittadini e consapevolezza dei consumatori

Disinformazione e scarsa consapevolezza

I cittadini spesso non sanno come smaltire correttamente i tessuti, in parte a causa di comunicazioni incoerenti da parte di operatori e comuni. Messaggi incoerenti e mancanza di campagne educative creano barriere alla partecipazione.

Cultura del rimpiazzo

La prevalenza di indumenti economici e di bassa qualità riduce la fattibilità degli sforzi di riparazione e riciclo, creando una cultura dell'usa e getta. Il fast-fashion ha radicato una mentalità in cui la riparazione o il riciclo sono percepiti come scomodi o inutili. Ciò è rafforzato dal costo estremamente basso dei nuovi indumenti. Mentre in alcuni stati membri come la Francia la riparazione è incoraggiata grazie a incentivi economici per i cittadini, le aziende non riescono a sviluppare servizi e infrastrutture di riparazione. Inoltre, per quanto riguarda il riutilizzo, il mercato dell'usato deve competere in termini di prezzo con gli indumenti di prima mano del fast-fashion, che scoraggiano i consumatori dall'acquistare articoli usati.

Opportunità di sviluppo

1. Momentum normativo che guida la circolarità

Esplorazione di modelli aziendali

Le direttive EPR ed Ecodesign presentano un'opportunità per standardizzare le pratiche di gestione dei rifiuti, promuovendo l'innovazione e la collaborazione lungo tutta la catena del valore. Con il divieto di distruzione di beni invenduti, i marchi devono esplorare soluzioni circolari e abbracciare la sostenibilità come vantaggio competitivo. Le aziende che adottano pratiche di gestione dei rifiuti trasparenti e sostenibili possono migliorare la reputazione del loro marchio e attrarre consumatori attenti all'ambiente. I governi dovrebbero fornire supporto finanziario per l'adozione di modelli circolari.

Servitizzazione del prodotto

Quando completamente integrato, il DPP può diventare uno strumento chiave per migliorare la trasparenza, ottimizzare la gestione dei rifiuti e fornire ai consumatori informazioni sui loro acquisti. Ad esempio, alcuni fornitori tecnologici hanno arricchito il DPP con funzionalità, come servizi di riparazione o piattaforme per la rivendita.

2. Progressi tecnologici

Industria 4.0

I sistemi di smistamento avanzati possono separare in modo efficiente i tessuti in base al tipo di fibra e alla qualità, aumentando i tassi di riciclaggio, riducendo la contaminazione e migliorando il recupero dei materiali per applicazioni di alto valore.

AI e soluzioni digitali

Le soluzioni digitali che impiegano l'abbinamento dei materiali AI e la tracciabilità della supply chain offrono opportunità per ottimizzare la gestione dei rifiuti e la logistica inversa, in particolare nei contesti pre-consumo. L'abilitazione della digitalizzazione potrebbe migliorare il processo decisionale, ridurre i costi e migliorare la collaborazione lungo la catena del valore.

3. Adozione di nuovi modelli di business circolari e collaborazioni

Da un punto di vista ambientale, le migliori opzioni praticabili per gestire i rifiuti pre e post-consumo prima del riciclaggio sono il riutilizzo e la rivendita e l'aggiornamento o l'upcycling del prodotto. Mentre le aziende spesso non dispongono di capacità specifiche, le partnership a livello di settore offrono la possibilità di condividere le conoscenze.

Mercati della rivendita e dell'usato

Questi modelli possono essere scalabili, vantaggiosi per l'ambiente ed economicamente sostenibili rispetto al riciclaggio. Aumentare la loro presenza sul mercato potrebbe ridurre significativamente gli sprechi tessili e la domanda di nuovi prodotti, offrendo ai marchi un ulteriore flusso di entrate.

Collaborazione lungo la catena del valore

La responsabilità condivisa e l'integrazione di soluzioni locali con le parti interessate dell'ecosistema possono gettare le basi per pratiche circolari su larga scala e condividere risorse, creando un sistema resiliente e chiudendo il cerchio sui rifiuti tessili. Inoltre, investire in impianti regionali di riciclaggio e riparazione può ridurre la dipendenza da lunghe catene di fornitura, ridurre i costi operativi, aumentare l'efficienza e allinearsi agli obiettivi di sostenibilità.

4. Coinvolgimento dei consumatori

Educazione

Informare i consumatori sui vantaggi del riciclo, del riutilizzo e della riparazione può spostare il comportamento verso un consumo sostenibile. Aumentare la partecipazione alle iniziative circolari può migliorare i tassi di raccolta e ridurre lo smaltimento in discarica o l'incenerimento.

Incentivi all'azione

Offrire incentivi finanziari o basati sulla convenienza ai consumatori per la partecipazione a pratiche circolari potrebbe guidare il coinvolgimento dei consumatori e creare una base di clienti fedeli per i marchi che adottano modelli

incentrati sulla sostenibilità. Iniziative come bonus di riparazione, sconti sull'usato o kit fai da te incoraggiano i consumatori ad adottare pratiche circolari.

Research limitations. *Questo studio fornisce un'esplorazione delle sfide e delle opportunità associate alla transizione verso una gestione sostenibile dei rifiuti tessili all'interno dell'Unione Europea. Sebbene i risultati offrano spunti preziosi, presentano al contempo diverse limitazioni. La ricerca si basa su interviste con stakeholder che rappresentano ruoli diversi nell'ecosistema dei rifiuti tessili, il che, sebbene ricco di prospettive, limita la generalizzabilità dei risultati. Inoltre, lo studio non approfondisce soluzioni circolari specifiche, concentrandosi invece su sfide e opportunità sistemiche più ampie. Pertanto, non fornisce una guida granulare per gli stakeholder che cercano di implementare particolari iniziative. Si incoraggia quindi un'indagine più approfondita su soluzioni circolari specifiche. Valutazioni dettagliate di tecnologie come il riciclaggio chimico, sistemi di smistamento automatizzati e progettazione di prodotti modulari fornirebbero spunti concreti per gli stakeholder del settore.*

L'attenzione geografica sull'Unione Europea introduce un ulteriore livello di specificità. Mentre la regione è leader mondiale nello sviluppo di quadri normativi come la Responsabilità estesa del produttore (EPR), i passaporti dei prodotti digitali (DPP) e le direttive sull'ecodesign, queste normative sono attualmente in una fase di recepimento, con gli stati membri in diverse fasi di adozione e implementazione. Questa incertezza normativa limita la capacità dello studio di valutare l'impatto a lungo termine di queste politiche o la loro scalabilità in diversi contesti. Di conseguenza, i risultati potrebbero non catturare completamente le dinamiche dei paesi al di fuori dell'UE o offrire un'applicabilità immediata in mercati meno regolamentati. La ricerca futura potrebbe affrontare queste limitazioni ampliando l'ambito di indagine e adottando metodologie complementari. Un campione più ampio e diversificato di stakeholder, tra cui decisori politici, consumatori e piccole imprese, arricchirebbe la comprensione delle barriere sistemiche e degli abilitatori. Studi comparativi in diverse regioni potrebbero illuminare come le diverse dinamiche normative, culturali e di mercato influenzano l'adozione di pratiche circolari. Inoltre, una ricerca longitudinale che monitori l'attuazione e l'impatto delle normative dell'UE potrebbe fornire preziose informazioni sulla loro efficacia e mettere in luce gli ambiti in cui è necessario apportare miglioramenti.

Managerial implications. *Questo studio sottolinea l'urgente necessità di una trasformazione sistemica nella gestione dei rifiuti tessili, allineando le pratiche ai principi dell'economia circolare in un momento di spinta legislativa all'economia circolare. La ricerca rivela che le sfide alla transizione sostenibile della gestione dei rifiuti tessili sono interconnesse e affrontarle richiede uno sforzo coordinato e multi-stakeholder tra regolamentazione, infrastruttura e coinvolgimento dei consumatori. Colmando le lacune identificate in letteratura, la ricerca futura può basarsi sulle fondamenta di questo studio offrendo una tabella di marcia più completa per la transizione verso un'economia tessile circolare. Sforzi congiunti sono essenziali per allineare il settore agli obiettivi di sostenibilità globali e mitigare l'impatto ambientale dell'industria della moda in modo efficace ed equo.*

Originality of the paper. *Per i decisori aziendali, questi risultati sottolineano l'importanza di adottare un approccio proattivo e strategico alla gestione dei rifiuti tessili. Investire in eco-design, tecnologie e iniziative di coinvolgimento dei consumatori non è solo un imperativo ambientale, ma un fattore di differenziazione competitiva fondamentale in un mercato sempre più attento alla sostenibilità. Le reti di collaborazione con riciclatori, decisori politici, fornitori di tecnologia e consorzi sono essenziali per affrontare le barriere sistemiche e scalare efficacemente le pratiche circolari, mentre infrastrutture condivise e hub di riciclaggio regionali possono ridurre i costi operativi e rendere le soluzioni circolari più accessibili ai marchi più piccoli.*

I decisori politici hanno anche un ruolo fondamentale nel promuovere la transizione verso la circolarità. L'introduzione di normative chiare e incentivi economici, come sussidi, incentivi fiscali e meccanismi di crediti di carbonio, ad esempio, può compensare gli elevati costi iniziali associati alle infrastrutture circolari e incoraggiare un'adozione più ampia. Le campagne educative tra comuni e cittadini sono ugualmente vitali, in quanto possono aumentare la consapevolezza e la partecipazione dei consumatori alle pratiche di gestione sostenibile dei rifiuti, promuovendo una cultura di responsabilità e coinvolgimento.

Affrontare queste sfide e cogliere le opportunità delineate in questo studio richiede un approccio sistemico e multi-stakeholder. L'allineamento di innovazione tecnologica, quadri normativi e strategie di coinvolgimento dei consumatori consentirà al settore di passare da una posizione reattiva a una proattiva, incorporando la circolarità come principio fondamentale piuttosto che come obbligo guidato dalla conformità. Questa transizione è essenziale non solo per mitigare gli impatti ambientali della produzione tessile e del consumo eccessivo, ma anche per promuovere la resilienza economica a lungo termine e il benessere sociale.

Keywords: *Circular economy, textile waste, waste management*.

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Developing a Capabilities Matrix for Agri-Food Companies in Piemonte

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Abstract

The agri-food sector in Piemonte holds a pivotal position in Italy's food economy, distinguished by its culinary heritage and exceptional product quality. Home to 84 PDO and PGI-certified goods-including white truffles, fine wines (19 DOCG, 42 DOC), artisan cheeses, and traditional cured meats-the region combines rich gastronomic traditions with strong branding and international recognition, making it an exemplary setting for studying capability development and strategic positioning. Beyond its artisanal strengths, the sector also faces increasing pressure to enhance efficiency, innovation, and sustainability across its entire supply chain, from production to logistics and waste management. This study introduces a capabilities matrix to systematically assess competencies across the agri-food value chain, from production to waste management. Grounded in the resource-based view and dynamic capabilities framework, the matrix serves as an organisational tool that enables firms to leverage their strengths, address capability gaps, and optimise resource allocation. In doing so, it also facilitates cross-fertilisation of expertise, promotes knowledge transfer across the value chain, and supports sustainable growth and internationalisation. Notably, the matrix also functions as a strategic guide for investors, offering a structured overview of where key capabilities and growth opportunities reside across the ecosystem.

The research follows a multi-stage methodology, integrating a literature review, sector analysis, ongoing empirical data collection and interview. Initial study highlights significant capability variations in product processes, certification compliance, and digital adoption (e.g., blockchain for traceability, IoT for efficiency). The paper also underscores the role of regional heritage, collaborative networks, and regulatory frameworks in shaping competitiveness. At this stage, data collection is ongoing, with structured surveys and interviews capturing insights from SMEs, trade agencies, and industry stakeholders. Preliminary analysis is based on responses from 42 firms, providing an initial but incomplete view of the sector's capability landscape. As more data is collected, the capabilities matrix will be refined to reflect broader patterns, ultimately offering a comprehensive framework for firms, investors, policymakers, and trade organisations to navigate supply chain challenges, pursue international expansion, and drive innovation-led growth.

This research contributes to strategic management and regional development literature by offering a holistic, empirically grounded model that captures the interplay between traditional expertise, supply chain efficiencies, and modern competitive strategies in the agri-food sector. Future phases will validate the matrix, enhance its application, and develop actionable recommendations for sustainable and globally competitive growth.

Framing of the research. *In today's competitive global market, understanding and leveraging firm capabilities is critical for sustainable growth and internationalisation. Building on Piemonte's world-renowned gastronomic heritage introduced above-including truffles, wines, cheeses, and vermouth-the region offers an exceptional environment for studying capabilities. Initiatives like Slow Food, the Wine Bank, and the University of Gastronomic Sciences further strengthen this ecosystem. According to the ISMEA (2023), Piedmont ranks fourth in Italy for the economic impact of the IG sector with a value of 1,716 million euros generated in 2022 by 84 PDO IGP food and wine supply.*

Capability matrices have increasingly been used by trade agencies, development organisations, and industry actors around the world as tools to benchmark and visualise firm competencies across supply chains. These tools have proven effective in practice for mapping capabilities, identifying sector-wide strengths and gaps, and informing policy and strategic action. However, despite their widespread real-world use, there is limited academic literature that systematically explores or theorises the application of capability matrices in regional or sectoral contexts. Most scholarly treatments of capability matrices have focused on internal firm-level competencies, such as technological, strategic, and operational capabilities (Evaristo & Zaheer, 2014; Horn, 1999; Tho, 2018; Isobe, Makino, & Montgomery, 2008), with little emphasis on broader ecosystem-wide usage.

Addressing this gap, our study introduces a capabilities matrix specifically designed to reflect the unique structure, dynamics, and competitive environment of the agri-food industry in Piemonte. Based on original data and industry consultation, we construct a matrix that is grounded in the resource-based view (RBV) and dynamic capabilities

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frameworks. Central to our framework is RBV, which asserts that a firm's unique resources-ranging from raw materials and modern production facilities to intangible resources such as traditional know-how and regional reputation-underpin its competitive advantage (Barney, 1991). Complementing the RBV is the dynamic capabilities framework, which emphasizes a firm's ability to build, integrate, and reconfigure its internal competencies in response to evolving consumer preferences, regulatory changes, and technological advancements (Teece et al., 1997). Within the Piemonte agri-food sector, this dual lens captures how firms leverage both tradition and innovation to sustain competitiveness. While capability matrices have occasionally been applied to global value chain research-such as Sato and Mai's (2009) work exploring firm-level learning trajectories in developing economies-there remains limited application within advanced regional economies or high-value agri-food systems. Our study builds on these insights by adapting the capability matrix to a complex, innovation-driven European agri-food context.

Developed in collaboration with the regional internationalisation agency and combining academic and industry expertise, the matrix was initially piloted using data from 120 SMEs compiled by a regional internationalisation agency under the Integrated Supply Chain Program (funded by European FESR). Our enhanced approach broadens both the scope and the pool of companies to cover the entire agri-food value chain. This expanded matrix not only provides a detailed snapshot of current competencies but also serves as a strategic tool for identifying strengths, addressing weaknesses, guiding resource allocation, and monitoring progress toward international market success.

Building on these theoretical foundations, our matrix captures a range of dimensions that characterise competitive strengths across the agri-food ecosystem. Specifically, the matrix incorporates ten major dimensions, identified through literature review, sectoral analysis, and industry consultation:

- *Products and Services (e.g., food products such as meats, dairy, bakery; non-food agricultural products such as biofuels, pharmaceuticals);*
- *Processes (primary, secondary, tertiary, covering raw material preparation, product refinement, and enhancement);*
- *Packaging (including in-house packaging, materials like glass, plastic, biodegradable, and technologies like vacuum packaging, aseptic processing);*
- *Logistics (storage, transportation, in-house logistics);*
- *Distribution (retail, wholesale, online channels, order fulfilment);*
- *Waste Management (recycling, edible and non-edible by-products);*
- *Technology (machinery, food technologies, precision farming, blockchain, IoT, artificial intelligence, data analytics);*
- *Sustainability and Innovation (corporate social responsibility, product and process innovation, supply chain transparency);*
- *Certifications (ISO 22000, BRCGS, IFS FOOD, FSSC 22000, HACCP, PDO/DOP, PGI/IGP, BIO, Slow Food, PAT);*
- *Financial and Market Performance (including export turnover).*

Another distinctive aspect of this framework is its attention to the regional ecosystem, which includes cultural, geographic, and institutional factors. By drawing on cluster and network theories (Porter, 1998; Todeva et al., 2007), we account for how geographic proximity, collaborative networks, and inter-firm knowledge exchange enhance regional competitiveness. This ecosystem approach allows the matrix to reveal not only individual firm capabilities but also the collective strengths and coordination mechanisms that drive sectoral performance.

By adapting and extending the capabilities matrix beyond its traditional firm-level use, this study provides a comprehensive, empirically grounded tool to diagnose capabilities, inform strategic decision-making, and guide sustainable, innovation-driven growth across the Piemonte agri-food sector. Future phases of the research will focus on validating the matrix through empirical testing, refining its application, and developing actionable recommendations for firms, policymakers, and industry stakeholders.

Purpose of the paper. *This project aims to develop a capabilities matrix that systematically maps competencies across the agri-food supply chain in the Piemonte region, offering firms, policymakers, and industry stakeholders a robust analytical framework for strategic decision-making. By identifying strengths and areas for improvement within and across firms, the matrix provides a foundation for informed resource allocation, strategic positioning, and innovation planning. It is designed to align organisational resources with long-term growth goals, enhance international competitiveness, and support sustainable development.*

Leveraging both academic and industry expertise, the framework now extends beyond the original SME dataset to include a wider pool of actors across the value chain. It builds on dimensions and indicators previously outlined-covering areas such as operational efficiency, technological integration, regulatory compliance, and certifications-to deliver a comprehensive assessment tool. In doing so, the matrix enables benchmarking across firms and highlights sector-wide capability gaps and synergies.

As highlighted by Mendes et al. (2023), visually mapping firm capabilities can reveal critical endogenous learning processes that strengthen competitiveness within global value chains. Accordingly, this project pursues the following key objectives: -

- *To refine and operationalise key dimensions defining competitive capabilities in the agri-food sector.*
- *To construct a capabilities matrix that identifies strengths and areas for improvement among regional firms.*
- *To provide actionable insights for government agencies and businesses to support international market expansion.*

Methodology. *This study employs a multi-stage research design to systematically capture and analyse the capabilities of agri-food firms in Piemonte. The approach integrates a comprehensive review of the literature on agri-food systems, capability mapping, and the above mentioned RBV and dynamic capabilities framework, with robust empirical analysis. As stated, Piemonte provides a fertile research setting, hosting approximately 52,500 firms, including 4,300 food and beverage companies, 300 agricultural machinery suppliers, and 47,900 agricultural and forestry enterprises. Given the pivotal role of SMEs in driving regional competitiveness and innovation, the study prioritises SMEs in its sampling strategy.*

From an identified population of 1,400 firms across the agri-food value chain, a purposive sample of 350 companies was selected to receive structured questionnaires. The sample was designed to ensure broad sectoral coverage, including SMEs, service providers, logistics companies, packaging firms, and waste management enterprises. The questionnaire was carefully developed to assess firm competencies across ten key dimensions mentioned in the earlier sections.

The idea of capability matrix draws inspiration from several foundational works: Sato and Mai (2009) on capability mapping in developing-country manufacturing sectors; Porter's (1998) cluster theory and Todeva et al. (2007) on network dynamics, which highlight the role of geographic proximity and inter-firm collaboration; and at the firm level, the resource-based view (Barney, 1991) and dynamic capabilities framework (Teece et al., 1997). Additionally, insights from Nonaka (1994) on organisational knowledge creation, Zahra and George (2002) on absorptive capacity, and Knight and Cavusgil (2004) on SME innovation and internationalisation informed the matrix design and empirical approach. Recent research by Peirone et al. (2024) further underscores the importance of agglomeration economies, innovation ecosystems, and cross-firm cooperation in shaping SME competency development, particularly within the Piemonte region-reinforcing the ecosystem-level focus of this study.

The mentioned theoretical alignment stirred us to build a context-specific matrix that captures both static resources and the dynamic processes firms use to adapt, innovate, and grow.

Matrix Dimension	***Sub-Dimensions / Indicators***	***Data Source***	***Theoretical Basis***
Products and Services	*Food products (meat, dairy, grains, condiments, etc.), beverages, non-food agri-products (bioenergy, cosmetics, fibers, etc.)*	*Structured variables*	*RBV - Product portfolio as firm resources*
Processes	*Food: Primary (e.g., butchering), Secondary (e.g., pasteurisation), Tertiary (e.g., meal production)*	*Production activity*	*RBV & Dynamic Capabilities - Efficiency and learning routines*
	Non-food: Raw material refinement to advanced synthesis	*Non-food process indicators*	
Packaging	*Materials (glass, plastic, biodegradable), techniques (MAP, vacuum, smart packaging)*	*Packaging-related items*	*RBV - Technological assets and IP*
Logistics	*Storage (dry, cold, controlled), transport (in-house, outsourced, land, air, sea)*	*Logistics variables*	*Dynamic Capabilities - Operational agility*
Distribution	*Channels (retail, online, wholesale, direct), customer service, order fulfilment*	*Distribution and channel strategy*	*Dynamic Capabilities - Market adaptation / responsiveness*
Waste Management	*Recycling, edible and non-edible by-products, composting, waste-to-energy*	*Waste processing options*	*RBV - Environmental and operational assets*
Technology	*Machineries, precision farming, AI, blockchain, IoT, food tech, packaging tech, data analytics*	*Indicators of Technology Utilisation*	*Dynamic Capabilities - Innovation processes*
Sustainability & Innovation	*CSR activities, product innovation, supply chain transparency*	*Sustainability indicators*	*Dynamic Capabilities - Sensing and seizing opportunities*
Certifications	*ISO, HACCP, BRCGS, IFS FOOD, DOCG, PDO, BIO, etc.*	*Firm-reported certifications*	*RBV - Institutional and reputational assets*
Financial & Market Performance	*Export turnover*	*Turnover data (2024)*	*RBV - Performance outcomes*

To enhance the robustness of findings, the next research phase will expand data collection, increase sectoral representation, and conduct follow-up interviews with key stakeholders. These qualitative insights will enrich and triangulate the quantitative results. Planned cross-sectional analyses will explore capability patterns across firm sizes, supply chain roles, and market orientations. While the matrix is tailored to Piemonte's context, it has been deliberately designed for adaptability, allowing for comparative application in other regional and national agri-food systems. This integrated mixed-methods approach positions the study to deliver an empirically grounded, theoretically informed, and practically actionable framework for managers, industry associations, and policymakers.

Results. *The preliminary analysis of responses from 42 agri-food firms in Piemonte offers an important early snapshot of the sector's capability landscape. Among the respondents, 93% are food producers or service providers, while 7% are non-food providers or services, underscoring the dominant role of food-related activities in the regional agri-food ecosystem.*

The analysis reveals a diverse pattern of specialisation across the ten dimensions of the competence's matrix. In terms of certifications, a core focus in capability building, 63.2% of firms report having HACCP, 36.8% IFS Food, 26.3% BRCGS Food, 15.8% ISO 22000, and 13.2% ISO 22004 certifications. From an RBV perspective, certifications can be understood as valuable and often inimitable resources, as they combine operational routines, specialised know-how, and reputational assets that enhance competitive advantage. While Barney's RBV framework broadly identifies resources that are valuable, rare, inimitable, and non-substitutable (VRIN), Gomillion (2017) specifically highlights certifications as

meeting these VRIN criteria. Achieving certification typically requires internal capability development, coordination across functions, and long-term reputation building, making it difficult for competitors to imitate. Furthermore, certifications act as powerful market signals, enhancing consumer trust, facilitating international market access, and strengthening supplier and partner relationships. From a dynamic capabilities' perspective, certifications also reflect firms' ability to sense regulatory demands, seize differentiation opportunities, and reconfigure processes to meet evolving quality standards, positioning them for sustained adaptability.

In the domain of sustainability and innovation, 12% of firms have implemented corporate social responsibility initiatives, 76% report product innovation activities, and 44% have engaged in measures to improve supply chain transparency. Adoption of advanced technologies remains modest: only 8.3% of firms report using blockchain and IoT, 8.3% are employing artificial intelligence, and 8.3% have adopted CRM or business intelligence systems. In contrast, data analytics is used extensively by 91.7% of firms. Traditional technologies continue to form the backbone of operations, with 94.9% using conventional machinery, 53.8% applying food technology, 43.6% employing packaging technology, and 2.6% still relying on manual cutting or portioning methods. Waste management practices show considerable variation: 51.4% of firms engage in recycling, 28.6% make use of by-products, 20% implement composting, and 2% convert waste into energy. Under the RBV, sustainability initiatives and technological assets represent valuable, and in some cases rare, resources that can augment firms' reputational standing, enhance operational efficiency, and increase customer loyalty. More critically, from a dynamic capabilities' lens, practices such as product innovation, transparency, and selective technological upgrading reflect a firm's ability to sense emergent market demands, seize competitive opportunities, and transform internal and external resource configurations. The low penetration of cutting-edge technologies such as AI, blockchain, and IoT, however, points to a capability gap that may hinder the sector's potential to enhance adaptive capacity and achieve sustained international competitiveness.

Regarding supply chain and logistics functions, 93.8% of firms reported engaging in distribution services, 43.8% in supply chain management, and 43.8% in the operation of storage facilities. Interestingly, only 16.3% of firms manage transportation in-house, while 56.1% outsource these functions, underscoring the growing importance of networked and collaborative operational models. From the RBV perspective, advanced logistics and supply chain management capabilities constitute valuable and, in some cases, rare resources that enable firms to differentiate service quality, enhance responsiveness, and lower operational risks. Firms' ability to reconfigure resources and processes in response to environmental uncertainty is showed, from a dynamic capabilities' perspective, by their orchestration of complex supply chain partnerships and adaptive responses to disruptions and market volatility.

Collectively, these preliminary insights illustrate a heterogeneous sector, marked by variation in technological integration, operational maturity, and sustainability orientation. The ongoing data collection phase will be complemented by targeted interviews with selected firms and industry stakeholders to contextualise these patterns and validate the robustness of the capabilities matrix. These interviews will also capture qualitative nuances not easily derived from survey data, enriching the analysis and informing further refinement of the matrix.

Subsequent work will focus on analysing the combined data to identify key capability patterns, complementarities, and gaps across firms and value chain stages. Based on these findings, we will refine the capabilities matrix to ensure it reflects the multidimensional nature of agri-food firm competencies. Building on the refined matrix, the project will develop strategic recommendations for agencies, policymakers, and industry stakeholders. These recommendations will focus on strengthening firms' internationalisation capacity, upgrading innovation capabilities, and supporting cross-sectoral learning.

The finalised capabilities matrix is intended to serve as the keystone of a strategic framework aimed at promoting diversification and cross-industry collaboration. By enabling firms to map their competencies and identify complementary partners, the framework will facilitate knowledge transfer, stimulate innovation, and enhance the sector's adaptive capacity in a rapidly changing market landscape.

Research limitations. *This study faces several limitations that warrant careful consideration. First, the ongoing nature of data collection across the Piemonte region introduces variability in response rates across different segments, which may limit the generalisability of the early findings. At this preliminary stage, the dataset remains limited, and further data collection will be necessary to strengthen the robustness of the capability's matrix and the subsequent analysis. Additionally, given Piemonte's unique cultural and geographical context, the analysis is inherently context specific. While the matrix has been tailored to this regional setting, its multidimensional design offers promising potential for transferability to agri-food sectors in other regional and national contexts. The methodology developed here is intentionally adaptable and could be applied in other regions to examine similar supply chain dynamics. Finally, considering rapidly evolving consumer preferences and technological innovations, this study provides a static snapshot that highlights the importance of future longitudinal research to capture temporal changes and industry shifts. Accordingly, all findings should be interpreted as preliminary and exploratory, pending further data collection and validation.*

Managerial implications. *The development of the capabilities matrix offers a strong organisational tool for firms, trade agencies, and policymakers operating within agri-food sector. By systematically mapping competencies across the supply chain-from production to waste management-it enables a granular understanding of strengths, gaps, and opportunities for strategic enhancement.*

One of the matrix's primary managerial contributions lies in its ability to align internal capabilities with strategic objectives. By providing an evidence-based snapshot of firm resources and functional maturity, the matrix supports

informed decision-making regarding investment priorities, resource allocation, and competitive positioning. This structured visibility allows firms to move beyond reactive strategies and adopt proactive approaches tailored to evolving market conditions.

The matrix also plays a key role in facilitating cross-sectoral learning. By identifying transferable competencies across firm types and sub-sectors, it promotes knowledge spillovers and encourages the uptake of best practices from adjacent industries. This capability cross-fertilisation stimulates innovation, supports adaptive learning, and fosters experimentation-essential attributes for navigating technological disruption and market volatility.

In addition, the matrix aids firms in discovering diversification pathways, helping them recognise untapped synergies across markets and product categories. This insight is especially valuable for SMEs seeking to expand operational scope, enter new markets, or build strategic alliances. The resulting increase in flexibility contributes to greater organisational resilience and enhances long-term competitiveness.

From a supply chain perspective, the matrix offers tools to improve traceability, boost certification compliance, and upgrade quality assurance-essential for building trust with consumers and meeting increasingly complex regulatory requirements. By supporting logistics optimisation and collaborative distribution strategies, it also contributes to the design of more agile and resilient supply chains networks. Also, the matrix offers strategic guidance for investors by highlighting capability strengths, innovation potential, and growth-ready segments across the agri-food value chain-enabling more targeted investment aligned with regional development goals.

Finally, the matrix holds value at the policy level. Aggregated insights can inform targeted public interventions aimed at capability upgrading, cluster development, and innovation ecosystem strengthening. By linking firm-level competencies with regional development strategies, the matrix reinforces the dual goals of sectoral excellence and global competitiveness.

Originality of the paper. *This paper contributes to the literature by developing an innovative capabilities matrix grounded in an original dataset compiled from firms across the agri-food sector in Piemonte. Unlike traditional frameworks that examine firm-level competencies in isolation, our approach aggregates and synthesises insights from a broad spectrum of stakeholders-including primary producers, processors, service providers, logistics firms, and distributors. This wide-ranging scope enables the matrix to capture the full complexity and interdependence of capabilities across the agri-food supply chain.*

The integration of firm-level data with regional ecosystem analysis provides a unique empirical basis for diagnosing both individual strengths and systemic challenges. By applying the matrix across ten interrelated capability dimensions, the study offers a comprehensive view of how traditional resources-such as artisanal know-how, certification systems, and geographic identity-interact with contemporary strategic drivers like digital technology adoption, sustainability practices, and adaptive logistics. By embedding the matrix within the resource-based and dynamic capabilities paradigms, the paper also offers a theoretically robust model that can be replicated in other regional or sectoral contexts. This methodological and conceptual integration advances academic understanding of capability development in geographically embedded, innovation-driven industries.

Overall, the paper adds to the body of knowledge on supply chain innovation, regional development, and strategic management in the agri-food industry and beyond by offering a thorough and flexible tool that supports both academic research and real-world strategy.

Key words: *Agri-food supply chain, Capability matrix, Firms' competences, Competency mapping*

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Optimizing transportation management through product feature forecasting: a design science approach

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Abstract

The apparel industry is characterized by a diverse range of products, each with a variety of unique features, resulting in a complex mix that makes accurate volume estimation challenging. Inaccuracies in volume predictions can affect decision-making in logistics and transport planning, leading to increased costs and reduced performance. While existing literature has explored transport planning based on historical order sizes, estimated pallet counts, and routing decisions, few studies focus on volume estimation or three-dimensional inbound freight transportation. Additionally, emerging research on Artificial Intelligence (AI) applications in forecasting, logistics optimization, and real-time tracking can affect how such decisions are made. Design Science (DS) offers a framework to address complex managerial problems, benefitting both academics and practitioners. This study compares various well-known machine learning (ML) algorithms as alternative approaches to the current calculation methods used by a global fashion retailer. This research offers valuable contributions, particularly in transportation management and logistics distribution, by addressing procedures, metrics, and model selection. Moreover, it introduces a new forecasting category-"Forecasting Based on Product Features"-which contrasts with the traditional "Sales Forecasting" based on demand.

Framing of the research. *The apparel industry presents a highly intricate context, with a broad range of products and diverse product features - such as varying designs, styles, fabrics, sewing methods, and folding techniques - all within short product life cycles dictated by a high number of collections produced every year, especially in fast fashion. These complexities pose significant logistical challenges, particularly in accurately estimating freight volume, a critical factor that directly impacts transportation costs (Mehrjoo et al., 2014; Wen et al., 2019). Misjudging freight volume can lead to costly resource misallocations such as inefficient load planning, higher shipping expenses, and broader disruptions in supply chain operations. Implications extend beyond logistics, affecting transportation cost calculations, working capital management, return on assets, and overall supply chain performance (Rogerson and Sallnäs, 2017; Feizabadi, 2022; Culot et al., 2024).*

To navigate these challenges, companies are increasingly turning to data-driven strategies which can help optimize freight rates (McKinsey, 2023). To improve freight volume estimations, both traditional statistical models and Artificial Intelligence (AI) techniques have been explored. AI's ability to detect hidden patterns and approximate complex relationships has made it a valuable tool for predictive supply chain management applications. Recent research underscores the need for empirical studies examining AI's role in supply chain management from managerial, strategic, and operational perspectives (Richey et al., 2023; Ronchini et al., 2024). This growing academic interest highlights the importance of integrating technological advancements with practical logistics solutions.

Purpose of the paper. *Existing literature on forecasting highlights the difficulty of working with three-dimensional (length by width by height) measurements of fashion items, particularly when dealing with fabrics. This challenge arises due to the complexity of reconciling incongruent information caused by material properties (Ravasi and Stigliani, 2012; Abecassis-Moedas, 2006). While existing literature has explored transport planning based on historical order sizes, estimated pallet counts, and routing decisions, few studies focus on volume estimation or three-dimensional inbound freight transportation.*

Cannas et al. (2023) shed light on the applications of AI Supply Chain Management (SCM) such as inventory management, demand forecasting and detecting the volume of the parcels during in the return process. This study underline the common goals of applying AI in SCM in the which are reducing the time required for decision support, reducing human resources for repetitive tasks, and increasing capacity utilization. However, predicting volumes is still underexploring.

Hendriksen (2023) and Wamba et al. (2023) illustrate AI's potential to revolutionize supply chain management through innovative applications in forecasting, logistics optimization, and real-time tracking and tracing, thereby assisting managers in making aware decisions. In addition, AI technologies, such as machine learning techniques, open

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new pathways for efficiently managing complex calculations, enabling more accurate forecasts of merchandise dimensions (Richey et al., 2023). The apparel industry has undergone significant transformation with the introduction of new technologies, such as AI. AI influences fashion retail supply chain processes by enhancing demand forecasting accuracy (An et al., 2024), improving production processes by incorporating product features (Mohiuddin et al., 2024). However, limited empirical research has explored the application of AI technology as a forecasting technique to predict freight volumes for apparel products.

Accordingly, this paper addresses the following research question: How can AI technology enhance the shipping process in the apparel industry by introducing advanced estimation techniques for freight volume?

To answer this research question, which has practical and theoretical aims, we intend to move beyond problem-solving into theory building based on pattern detection and metrics to evaluate alternative models, using an abductive reasoning contribution, following suggestions by Chou et al. (2023).

Methodology. *As introduced by Holmström et al. (2009), to effectively integrate real-world managerial challenges with academic research and to provide valuable insights for both scholars and practitioners, this study adopts a Design Science (DS) approach. DS bridges theoretical advancements and practical applications and this research design was based on the recommendations of Bagni et al. (2024) and Gupta et al., (2024) and Naim and Gosling (2023). This research follows a structured DS approach, progressing through the key phases outlined in Table 1, with the following detailed steps:*

1. *Solution Incubation - In this initial phase, we employ the "Thinking Process" tool proposed by Groop et al. (2017). This phase involves problem structuring, hypothesis formulation, and iterative refinement of potential approaches, with the aim of conceptualizing and developing preliminary solutions.*
2. *Solution Refinement - To enhance the robustness of the proposed preliminary solution, we followed the recommendations of Chou et al. (2023) to ensure a systematic assessment of causal relationships, enabling data-driven adjustments and optimizations*
3. *Examination and Evaluation - We conduct a rigorous comparative analysis in the final phase by benchmarking various established statistical models and machine learning (ML) algorithms. Specifically, we assess Ordinary Least Squares (OLS) regression, XGBoost, and Random Forest (RF) and compare them with the current computational methods employed by a leading global fashion retailer. This evaluation aims to determine the proposed approach's effectiveness, accuracy, and scalability in real-world applications.*

By systematically implementing these phases, this study ensures a scientifically rigorous yet practically relevant approach to addressing contemporary managerial challenges.

Table 1 - Phases of the Design Science approach (Adapted from Holmström et al., 2009)

Research Type	**Exploration (Design Science)**		**Explanation (Theoretical Science)**	
Research Phase	Solution Incubation	Solution Refinement	Explanation I Examination and evaluation	Explanation II Formal Theory
Objective	What exactly is the problem?	What is the initial solution to solve it?	Substantive theory	Formal theory; generalizability
Methodology	- Initial meeting and Interviews with company employ - Thinking process of Theory of constraints(Goldratt 1990)	Thinking process of Theory of constraints(Goldratt 1990) A tool for effect detection and inference	Based on mutability artefacts we are going to identify theory in the literature in order to employ an abductive approach.	

For this study, the first phase "Solution Incubation" started by selecting a case company that will be referred to as "Fashion" for the purpose of anonymity. "Fashion" is a global fashion retail brand handling over 6,000 Twenty-Foot Equivalent Units (TEU) annually and managing approximately 100 million product units. Despite its operational scale, the company's prediction accuracy for high-volume items remains below 80%, underscoring the need for a more effective forecasting approach. However to better underline the practical relevance of this study, we have conducted a one-way sensitivity analysis using MS Excel which is "one-way sensitivity analysis is the simplest type of analysis and it consists of systematically varying one of the network's parameter probabilities while keeping all other parameters fixed" Borgonovo (2017). A one-way sensitivity analysis is essentially a graphical tool, and we can gain insights from the one-way sensitivity function graphs. This preliminary analysis consider how the profit can varies with changes in

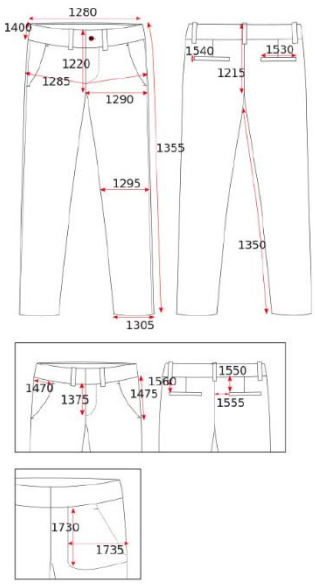
transportation costs. This calculation helps to determine how changes in these parameters can impact profitability in the model.

As suggested by Öhman et al., 2021 we started with preliminary meetings with managers of the case company which helped to better align the empirical research in logistics and supply chain management and the DS approach. The assessment meetings with company managers helped also to gain a comprehensive understanding of the managerial issue. During these sessions, we: a) documented discussions and compiled detailed notes; b) mapped the current estimation process to pinpoint inefficiencies; c) examined shared data to analyze the characteristics of products used in the retailer's forecasting model.

As per Öhman et al. (2021), based on these discussions, a Current Reality Tree (CRT) diagram was created, a well-established method used by several scholars (Groop et al., 2017; Kaipia et al., 2017; Tanskanen et al., 2015) This method is based on Thinking Processes (TP) tools, which are part of the Theory of Constraints (TOC) framework (Goldratt, 1990). The idea is to collect and analyze data from a system to fully understand it.

These meetings helped us also to deeply understand the role of the product feature to detect the volume of the product. Therefore, we gathered quantitative data from the retailer's master dataset, encompassing key product feature such as dimensions, seasonality, seeewing technique, and measurement point as reported in the example of product features in Figure

Figure 1 - Example of measurement point of features of an apparel product adpated from Li et al. (2017)



ID	Measurement point
1190	HIP POSITION FROM TOP WAIST
1195	KNEE POSITION
1215	BACK RISE
1220	FRONT RISE
1280	HALF WAIST
1285	HALF HIP
1290	HALF THIGH
1295	HALF KNEE
1305	HALF BOTTOM
1310	BOTTOM SIDE FORWARD (BOTTOM PART)
1350	INSEAM
1355	SIDE TOTAL LENGTH
1375	FLY OPENING
1380	FLY STITCHING WIDTH
1400	WAISTBAND HEIGHT
1415	WAISTBAND HOLE POSITION
1470	FRONT POCKET WIDTH
1475	FRONT POCKET HEIGHT
1530	BACK POCKET WIDTH
1540	BACK POCKET HEIGHT
1550	BACK POCKET DISTANCE on top
1555	BACK POCKET DISTANCE on c back
1730	FRONT INNER POCKET BAG LENGTH
1735	FRONT INNER POCKET BAG WIDTH
1780	FABRIC ELASTICITY % IN WIDTH
1785	FABRIC ELASTICITY % IN LENGTH

Specifically, we collected a dataset with 887 observations of single fashion product such as (Pants, T-shirt, Jacket) with their 41 product features. These product features represent the independent variables in our statistical models, while the dependent variable is represented by the effective product volume (calculated by multiplying the length by width by height as suggested by Abecassis-Moedas, 2006). Table 2 summarizes the variables, reporting also the descriptive statistics and their description. We conducted graphical analyses, including scatter plots and correlation matrices, to investigate the relationship between the dependent variable and independent variables.

Table 2 - Descriptive statistics and feature descriptions

Product feature name (Indipendent Variable)	Variable description	Data Type	Obs	Mean	Std	Min	Max	Dropped
Back_Across	This refers to the horizontal measurement across the back of a garment, from one shoulder seam to the other. It is taken at the back and typically measured at a point across the shoulder blades. This measurement ensures the garment fits properly across the upper back without being too tight or loose.	Continuous	887	39,20	9,28	0,00	90,40	
Back_Yoke_Height	The back yoke is the horizontal panel of fabric at the upper back of a garment (typically seen in shirts or jackets). The Back Yoke Height measures the vertical distance from the top of the garment (usually at the neck seam or collar seam) down to the bottom seam of the yoke. This helps in determining the proportion of the upper back section.	Continuous	887	4,60	7,36	0,00	50,50	
Center_Back_Collar_Height	Refers to the vertical measurement taken from the point where the collar joins the body of the garment (typically at the center back neck seam) to the top edge of the collar. This measurement is used to determine the height or thickness of the collar at the back, ensuring proper fit and comfort, especially for shirts, jackets, or coats.	Continuous	887	3,13	4,31	0,00	20,00	
Center_Back_Length	The measurement from the center of the back neckline (at the collar seam) down to the bottom hem of the garment. This determines the overall length of the garment at the back.	Continuous	887	62,20	17,36	26,80	122,70	Yes
Flap_Height	The vertical measurement of a flap (such as a pocket flap) from its top edge to its bottom edge.	Continuous	887	1,65	2,92	0,00	26,00	
Flap_Width	The horizontal measurement of a flap across its widest part.	Continuous	887	2,78	5,92	0,00	36,00	
Front_Across	This refers to the horizontal measurement across the front of the garment, from one side seam to the other, usually measured just above the bust or chest area	Continuous	887	34,13	11,85	0,00	67,70	
Front_Length_From_Shoulder_Point	The vertical measurement from the top of the shoulder (where it meets the neckline) down to the front hem of the garment.	Continuous	887	65,04	17,12	30,00	127,60	Yes
Front_Zipper_Length	The measurement of the zipper placed on the front of the garment, from the top of the zipper to the bottom of it.	Continuous	887	39,29	34,93	0,00	665,00	
Half sleev	= 1 if the item has Half sleeve, = 0 otherwise	Continuous	887	56,13	13,99	0,00	76,00	
Half_Bottom	The measurement of the garment at the bottom hem, taken from one side seam to the other. "Half" refers to only measuring the front or back width, not the full circumference.	Continuous	887	48,41	10,91	0,00	96,00	
Half_Chest	The horizontal measurement across the chest, from one side seam to the other, typically taken just below the armpits. This is half of the full chest circumference	Continuous	887	50,72	9,06	31,50	84,00	Yes
Half_Collar_Length	The horizontal measurement from the center back seam to the front edge of the collar, typically half of the full collar length.	Continuous	887	13,94	12,03	0,00	45,00	
Half_Elbow	The horizontal measurement across the elbow area of the sleeve, typically taken at the midpoint of the sleeve's length.	Continuous	887	15,62	3,62	0,00	26,70	
Half_Muscle	The horizontal measurement across the widest part of the upper arm (bicep area) when the sleeve is laid flat.	Continuous	887	18,53	4,34	0,00	47,00	
Half_Neckline	The horizontal measurement of the neckline across the front or back of the garment. It can refer to the width of the neck opening when measured flat.	Continuous	887	23,32	5,38	0,00	51,50	
Half_Shoulder	The measurement from the base of the neckline (where the shoulder seam starts) to the end of the shoulder seam, typically half of the total shoulder widt	Continuous	887	12,32	5,45	0,00	105,00	
Half_Waist	The horizontal measurement across the waist area, from one side seam to the other. This is half of the full waist circumference.	Continuous	887	43,44	16,16	0,00	65,00	
Hood	= 1 if the item has hood, = 0 otherwise	Continuous	887	21,05	23,45	0,00	59,50	
Hood_Circumference	The total circumference of the hood opening, measured around the edge where the face would be.	Continuous	887	21,04	23,43	0,00	59,50	Yes
Hood_Width	The horizontal measurement of the hood from one edge to the other, measured across the top or back of the head when the hood is laid flat.	Continuous	887	11,56	12,90	0,00	37,00	Yes
length	This measure indicated the length of the item	Continuous	887	65,04	17,13	30,00	130,00	
Man	= 1 if the item belongs to the Man collection, = 0 otherwise	Binary	887	0,51	0,50	0,00	1,00	Yes
Padding	= 1 if the item has padding, = 0 otherwise	Binary	887	0,41	0,49	0,00	1,00	
Pocket_Distance_On_Bottom	The vertical distance from the bottom hem of the garment to the bottom edge of the pocket.	Continuous	887	21,93	18,74	0,00	65,00	
Pocket_Distance_On_Top	The vertical distance from the top edge of the pocket to a reference point, such as a seam or the neckline.	Continuous	887	22,95	14,13	0,00	52,00	
Pocket_Opening	The horizontal measurement of the opening of the pocket (the space where the hand enters).	Continuous	887	12,48	5,53	0,00	28,50	
Pocket_Position_From_Bottom	The vertical distance from the bottom hem of the garment to the point where the pocket begins.	Continuous	887	10,03	10,47	0,00	58,00	
Season	= 1 if the item belongs to the Spring Summer season = 0 otherwise	Binary	887	0,37	0,48	0,00	1,00	
Shoulder_Forward	This refers to the placement of the shoulder seam being slightly forward of the traditional shoulder line, often done for design or fit purposes. It indicates how much the shoulder seam is moved forward.	Continuous	887	1,92	1,57	0,00	15,00	
Shoulder_Width	The horizontal measurement from one shoulder seam to the other, taken across the back or front.	Continuous	887	41,24	9,72	0,00	97,00	
Side_Length	The vertical measurement taken from the underarm (where the side seam begins) down to the bottom hem of the garment.	Continuous	887	37,38	15,94	0,00	94,10	Yes
Sleeve_Length	The measurement from the shoulder seam (or from the center back neck in raglan sleeves) to the end of the sleeve cuff.	Continuous	887	56,20	13,86	0,00	76,00	Yes
Sleeve_Opening	The measurement of the circumference or width of the sleeve at the cuff or hem.	Continuous	887	11,11	2,74	0,00	30,00	
Total_Armhole	The total circumference measurement of the armhole, typically from where the sleeve is attached to the body of the garment.	Continuous	887	47,84	9,68	0,00	82,50	
Vacum	= 1 if the item packaging is treated by vacum, = 0 otherwise	Binary	887	0,18	0,38	0,00	1,00	
Volume_eff	This is the Dependent variable which is the volume (length x width x height)	Continuous	887	0,01	0,01	0,00	0,03	
Waist_Position	The vertical measurement from the top of the garment to the waistline, marking where the natural waist falls on the garment.	Continuous	887	27,26	15,00	0,00	62,50	
Weight	This measure indicated the weight of the item	Continuous	887	239,15	185,62	40,00	999,00	
Width	This measure indicated the width of the item	Continuous	887	50,71	9,06	31,50	84,00	
Woman	= 1 if the item belongs to the woman collection, = 0 otherwise	Binary	887	0,42	0,49	0,00	1,00	

According to Budak and Sarvari (2021), we partitioned the dataset into:

- *A Training Dataset, consisting of historical product data and their respective attributes. In our sample these data were referred to the year 2022.*
- *A Test Dataset, containing newly introduced items along with their associated features for predictive analysis. In our dataset these were concerning the year 2023.*

Results. *In this section will be presented the the second and the third phases of the DS approach, starting from the second phase "Solution Refinement "the existing literature, particularly Chou et al., 2023, suggested to follow the*

following steps 1) "Ensemble construction", 2) "Importance assessment", 3) "Pattern visualization" to present how the results were build.

The first step "Ensemble construction" started by building the training dataset using the database extraction provided by the company. Then, we performed the Pearson correlation analysis as suggested by Jonsson et al. (2023), which allowed us to select 32 variables out of 41, the dropped variables from both the training and testing datasets are listed in Table 2. In the second step, "Importance assessment" in line with Senoner et al. (2022), we employed an "Importance assessment" procedure named the "Mean Decrease Impurity" (MDi), which determines the importance of features by ranking the variables involved in the regression models using the training dataset after the feature reduction as reported in Figure 2 and 3.

Figure 2 - Feature importance with RF algorithm

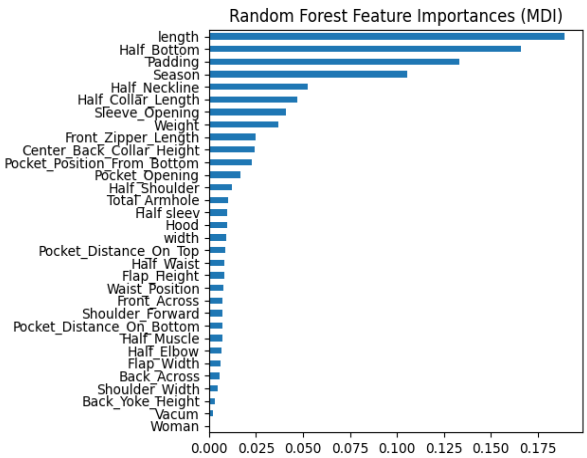
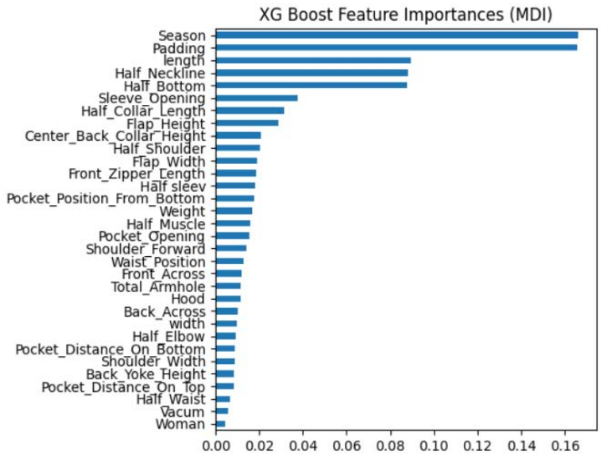


Figure 3 - Feature importance with XGB algorithm



Subsequently, we ran the regression model using the remaining feature set on the training dataset, followed by predictions on the testing dataset. This procedure resulted in different selected features, as shown in Figure 4, highlighting the selection differences between the XGB and RF models.

Figure 4 - Feature selection model-by-model

Training Dataset Features	RF	XGB	LASSO	OLS
Back_Across				
Back_Yoke_Height				
Center_Back_Collar_Height	✓	✓		
Flap_Height			✓	
Flap_Width			✓	
Front_Across	✓	✓	✓	✓
Front_Zipper_Length				
Half sleev	✓	✓	✓	✓
Half_Bottom	✓	✓	✓	✓
Half_Collar_Length	✓	✓	✓	✓
Half_Elbow				
Half_Muscle		✓		
Half_Neckline	✓	✓		
Half_Shoulder	✓	✓		
Half_Waist			✓	✓
Hood			✓	✓
length	✓	✓	✓	✓
Padding	✓	✓		
Pocket_Distance_On_Bottom			✓	✓
Pocket_Distance_On_Top			✓	✓
Pocket_Opening	✓	✓		
Pocket_Position_From_Bottom	✓	✓	✓	✓
Season	✓	✓		
Shoulder_Forward		✓		
Shoulder_Width			✓	✓
Sleeve_Opening	✓	✓		
Total_Armhole	✓		✓	✓
Vacum				
Waist_Position	✓	✓	✓	✓
Weight	✓	✓	✓	✓
Width			✓	✓
Woman				
Sleeve_Opening	✓	✓		
Total_Armhole	✓		✓	✓
Vacum				
Waist_Position		✓	✓	✓
Weight	✓	✓	✓	✓
Width			✓	✓

To properly select product features, we followed the approach of Chou et al. (2023), who trained models using tree-based methods and tuned hyperparameters (e.g., minimum leaf size, sampling fraction) through a model-based approach. This iterative process-propose, evaluate, and select-was found to be more effective than traditional grid or random search methods for hyperparameter optimization (Probst et al., 2019). After selecting the features for the model, we proceeded with the prediction procedure using the testing dataset.
The third step, "Pattern visualization" helps to highlight the differences between the predictions and the selected features. For brevity, only the top two important features of the RF model are shown in Figures 5 and 6, and the top two features of the XGB model are shown in Figures 7 and 8, the remaining analysis will be provided upon request.

Figure 5 - Prediction performed by Random Forest vs Length feature

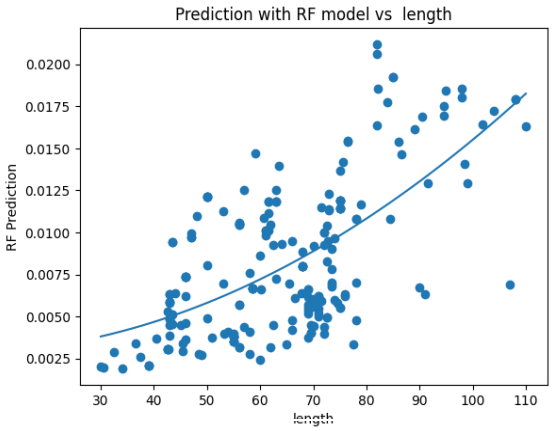


Figure 6 - Prediction performed by Random Forest vs Half_Bottom feature

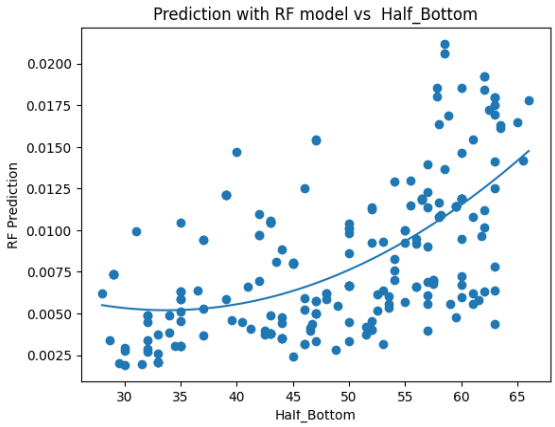


Figure 7 - Prediction performed by XGB model vs Season

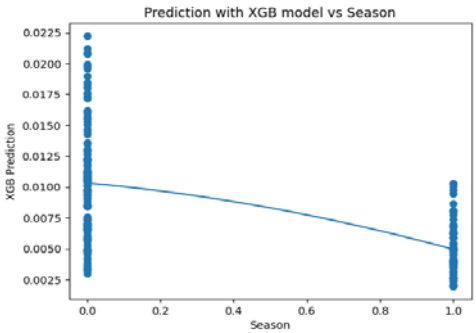
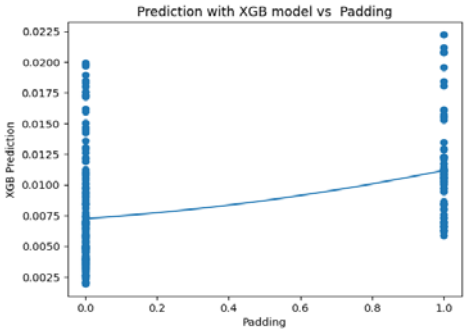


Figure 8 - Prediction performed by XGB model vs Padding



The third Phase of the DS approach called "Examination and Evaluation" reports the final step helps determining which model performs better than the others.
According to the following forecasting accuracy metrics selected:
1) *"Log Accuracy Ratio" (LAR) studied by Tofallis (2015) and Jonsson et al. (2024)*
2) *Mean Absolute Error (MAE) used by Budak and Sarvari (2021) and Verstraete et al. (2019)*
3) *Bayesian Information Criterion (BIC) reported by Cameron and Trivedi (2009).*

Table 3 shows that the LASSO algorithm performs best regarding variance. However, based on the MAE, the RF model performs better. Nevertheless, the hypothesis test confirmed that the prediction data of each model reject the null hypothesis of homoscedasticity, indicating that all data models are heteroskedastic, therefore, according to Tofallis (2015) LAR metrics is particurly helpful to compare model in case of heteroskedasticy presence. Indeed, the XGB model produces a lower value of 0.14565 for the LAR metric, compared to CONCA, which performs at 0.17752, and RF at 0.15669.

Although, MAE and BIC are lower in the RF model compare with XGB model, according to Tofallis (2015) due to the heteroscedasticity presence XGB model has to consider the best model to predict the volume of the product using product feature having also lower variability.

Table 3 - Evaluation metrics results with the selected features

Model	RF	XGB	LASSO	OLS	CONCA
Mae	0.00283	0.00286	0.00318	0.00312	0.00259
LAR	0.15669	0.14565	0.20245	0.20699	0.17752
Variance	2.02e-05	2.21e-05	1.73e-05	1.91e-05	4.07e-05
BIC	-8959.4	-9463.1	-7069.5	-7070.9	-2192.7

These results have also further supported by the probability density plot of the error distribution between the predicted and true values, as shown in Figures 9 and 10. In these plots, the XGBoost model shows error values above 150, while the CONCA model has error values equal to 150.
These results allowing concluding that using XGB model the prediction of the volume can be more accurate rather than using the actual model

Figure 9 - Probability function of predicted values residuals performed

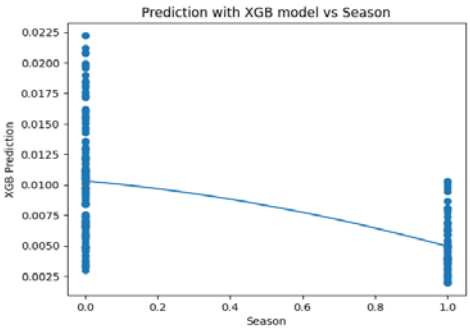
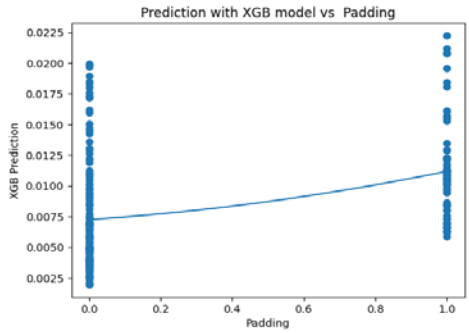


Figure 10 - Probability function of predicted values residuals performed



One of the most intriguing insights from this research is the unexpected nature of feature selection. A feature that appears insignificant in one model may prove essential in another. For example, while the RF model assigns low importance to "Padding," the XGB model identifies it as a key factor significantly enhancing performance.

Moreover, the number of selected features varies across models: the XGB model utilizes 20 features, whereas the RF model selects only 15 out of a total of 32. This indicates that incorporating a larger set of highly influential features can improve model accuracy.

Another notable finding involves the comparison of different modeling approaches. Unlike Chou et al. (2023), who did not evaluate XGB, our study highlights it as the top-performing model for predicting garment volume, outperforming both RF and LASSO regression. Additionally, our analysis accounts for model variance-an essential aspect of performance evaluation-addressing a gap left unexamined by Chou et al. (2023) and Senoner et al. (2022).

Research limitations. *This research is limited to the apparel industry, with a specific focus on a single product category and the collections from 2022 and 2023. Future studies could extend this scope by exploring other product categories and industries, applying new algorithms, and examining additional variables. Researchers may also use the same metrics to explore different contexts. However, further research could improve upon this by studying other metrics or proposing new evaluation approaches to enhance the analysis in the apparel industry. This study also Additionally, future research could assess the impact and magnitude of transportation costs on performance, either in the fashion industry or in other sectors facing similar volume-related challenges, to emphasize the importance of estimation methodologies.*

Additionally, further studies investigate different retail contexts to determine if decision-makers behave by applying ML algorithms. Future research could also adopt a Design Science (DS) approach across various retail contexts, measuring how product volumes affect profitability at downstream levels of the supply chain. Further research could implement the remaining phase by formalizing a theory to explain the factors explored in this study.

Managerial implications. *This research has several managerial contributions: First, by reducing variance of the error and from a managerial perspective, managers are able to access more accurate and reliable information. This improved information allows the transportation function to plan the container loading process better, leading to a more precise and timely estimation of transportation costs throughout the downstream levels of the supply chain. Second,*

managers dealing with fashion item volume estimations, particularly in the delivery process, this research may help them approach data without any transformation to avoid dealing with heteroskedasticy, ensuring reliable results.

Third, with a clear understanding of the model algorithm, managers can easily apply it using Python code without requiring in-depth knowledge of statistics. This accessibility simplifies the integration of advanced AI tools into managerial decision-making processes, making them more efficient and less dependent on technical expertise. Fourth, as confirmed by retailer managers, having accurate estimations can be helpful for collection planning and procurement in general, enabling better awareness in terms of performance, as confirmed by Guida et al. (2023). Fifth, the quality tool applied to evaluate the intervention can also assist managers in assessing any interventions in the delivery process by enhancing accuracy enables better planning of container loading processes, leading to more precise and timely estimates of transportation costs across downstream levels of the supply chain.

Finally, the research helps managers access more accurate and reliable information by proposing a specific pathway for integrating machine-learning algorithms with freight volume forecasting. We utilized the Design Science approach to support managers in making more rigorous and informed decisions, to enhance decision-making outcomes.

Originality of the paper. *The originality of this research lies in several key contributions. First, it introduces a new forecasting category, "Forecasting Based on Product Features," as an alternative to the traditional "Sales Forecasting" based on demand. Second, it provides a novel theoretical contribution to forecasting applications within the logistics and supply chain management research field. Third, this study offers practical benefits by guiding managers on procedures, metrics, and model selection, specifically demonstrating how to handle data variability using the Least Absolute Residual (LAR) metric. Fourth, approaching this research through the Design Science (DS) approach not only provides a structured method for problem-solving but also fosters theoretical advancements and generates economic impact across the entire supply chain, from upstream to downstream.*

Keywords: *Retail supply chain; Inbound logistics; Delivery process; Machine learning; Fashion; Product volume estimation.*

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Unveiling Omnichannel Strategy Dynamics through Topic Modeling Methodology and Fuzzy-TISM Analysis

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Abstract

The omnichannel revolution is imposing a novel holistic entrepreneurial vision of customer experience that transforms firms strategy, leading organisations to provide a value proposition integrating seamlessly across all of any possible channel. The first objective of our research is to review omnichannel literature to highlight the main research areas that have emerged in recent years adopting the Structural Topic Modelling methodology. This technique leads to identify seven relevant topics. The second part of our research consists in designing a Fuzzy-TISM study which will uncover relationships and mutual influences existing among the factors, deducing interlinkages and impacts on omnichannel strategy and customer experience.

Framing of the research. *Every component of a firm's offering, including customer service, advertising, packaging, product and service features, usability, and trustworthiness, stimulates a reaction in the customers. In the attempt to maximise the value generated for the customer along the entire end-to-end customer journey, firms should nowadays consider implementing an omnichannel strategy, which imposes a novel holistic vision of customer experience, taking care of any possible channel customer may use.*

Technology and data are playing a key role in this strategic shift. Technological solutions such as Artificial Intelligence (AI), Internet of Things, Augmented Reality (AR), Virtual Reality, Mixed Reality, Virtual Assistants, Chatbots, and Robots, can create experiential value (Hoyer et al., 2020) and make customer experience increasingly seamless, pleasurable, and stress-free. One-size-fits-all experiences are no longer enough, and organisations should leverage data to deliver personalised experiences, by means of the different channels (Holmlund et al., 2020).

The omnichannel strategy is indeed at the heart of retailers' digital transformation processes (Gao et al., 2021, Gerea et al., 2021). This strategy consists in co-ordinately managing several touchpoints and channels of communication between a firm and a customer to improve the quality of the customer's experience at the various stages of the purchasing process. The omnichannel business is defined as "the synergetic management of the numerous available channels […] in such a way that the customer experience across channels and the performance over channels is optimized" (Verhoef et al., 2015).

In this perspective, omnichannel customer experience can be defined as the sum of customer evaluations of different dimensions in every stage of their seamless experiences across all the organisation's channels (Rahman et al., 2022). However, despite there is agreement on the importance of offering an omnichannel experience, organisations are still struggling to align their long-term strategic vision with omnichannel goals, sometimes overfocusing on technological innovation rather than on customer value (Briedis et al., 2021).

We argue that omnichannel strategy and omnichannel customer experience are two sides of the same coin: deeply intertwined and mutually influential.

Purpose of the paper. *To further investigate this emerging and complex topic, we first conduct a literature review based on Structural Topic Modelling that encompasses all the aspects raised by the adoption of an omnichannel strategy, both from a customer and a firm perspective.*

Our research questions are: (1) what are the aspects characterising an omnichannel business? (2) Which of them are customer-oriented factors and which are more strategic, operational and technological factors?

Structural Topic Modelling approach enables to identify seven topics that embrace the multidimensionality of the omnichannel strategies and provide a structured overview of the main research areas emerging from a corpus of 448 academic abstracts.

In the second study characterising the paper, drawing on the literature review study, we design an empirical investigation that aims to answer the following research questions: (1) What are the success factors of an omnichannel strategy, within a firm, that can generate positive outcomes for the organisation? (2) What are the causal relationships

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between the different strategic areas in an omnichannel business, and how do they contribute to an effective customer experience? (3) How are the key factors driving omnichannel customer experience and behaviour interconnected, and what is their hierarchical structure?

This study applies the Fuzzy-TISM methodology to analyze the factors derived from the STM results. Advanced modeling enables exploration of causal relationships and hierarchical structure with respect to these factors, described in the study 2, thus deducing interlinkages and impacts on omnichannel strategy and customer experience.

The findings from these two analyses bring about an enhanced theoretical understanding and offer useful insights on entrepreneurial and strategic decisions in adopting an omnichannel business model. Omnichannel strategy is about relevant financial investment, technological and organizational changes to ensure a coherent and valuable user experience.

Study 1: Structural Topic Modeling

Methodology. *Structural Topic Modeling (STM) extends Latent Dirichlet Allocation (LDA) by allowing covariates (meta-information) that shows topic distributions based on (exogenous) factors such as publication date or author. STM is the only approach we will discuss that incorporates external variables to understand not just how topics may evolve over time, but how they might differ among classes of authors.*

We retrieved documents from the Web of Science (WoS) and Scopus databases through the relevant subject categories (Business, Management, Computer Science, Economics, etc.) by using the following search string "omnichannel" in title, abstract or keywords. The search, restricted to English-language articles, returned 948 records. We preprocess these abstracts using KNIME Analytics, removing duplicates, giving us 569 documents (Tursi and Silipo, 2018) and applying the ABS 2021 criteria further filtered it to 448 articles.

The text preprocessing process contained stop word removal, removal of rare terms and stemming (Kuhlen Stemmer). We built a bag-of-words based in monograms together with bi-grams taking 20 most frequent ones. STM was proposed then (Roberts et al., 2019) and differed from LDA in that it estimates document-specific topic distributions and enables topic correlation. The best number of topics was determined by maximization of exclusivity, semantic coherence, held-out likelihood and residual variance. After comparing alternative solutions with 6-8 topics, we settled for 7 topics for better readability and interpretability. Here, we summarize the identified topics in brief.

Results. *We categorized topics and provided topic-wise analysis for an extensive overview of omnichannel literature.*

Topic 1: Customer experience and journey

Customers engage in these interactions through the omnichannel customer experience and journey that brings together multiple channels into a unified flow (Rahman et al., 2022; Stead et al., 2022). The integration among online and offline channels enables continuity throughout consumer interactions throughout the purchasing process of pre-purchase to post-sales (Palazón et al., 2022). Performing that integration across channels is important for creating an effortless experience (Deng et al., 2022; Gao et al., 2021; Hossain et al., 2020; Cocco & Demoulin, 2022). Although literature supports the idea that channel integration has a positive impact, some studies reveal negative effects of inconsistent integration (Gasparin et al., 2022). This research also considers determinants of integration, particularly focusing on environmental and organizational dimensions researchers (Deng et al., 2022).

Topic 2: Online-offline integration models and financial strategies

In omnichannel retail, online-offline integration frameworks and financials are of importance, addressing challenges posed by the convergence of the digital and physical domains (Maier et al., 2023; Akter et al., 2021). Much research has been conducted to investigate Buy Online Pickup in Store (BOPS) strategies, considering profitability (Jain et al., 2020), pricing strategies (Gu et al., 2023), and supply chain dynamics (Wang et al., 2023; Jiang & Wu, 2022). Given how online-to-offline platforms facilitate offline sales, they do not compete with physical stores (Zhang et al., 2019).

Topic 3: Technology management

Technology management drives innovation and efficiency in omnichannel retail (Madsen, 2021). Mobile Augmented Reality (MAR), Big Data, AI, machine learning, and Blockchain are emphasized in the literature. MAR improves the physical shopping experience by using digital interaction (Alesanco-Llorente et al., 2023; Son & Oh, 2023; Zimmermann et al., 2023; El Abed & Castro-Lopez, 2024). Big Data and AI revolutionize operational efficiency and supply chains (Bag et al., 2023; Cai & Lo, 2020; Malik et al., 2023), whereas Blockchain optimizes logistics and enhances circular economy practices (Naclerio & De Giovanni, 2022; De Giovanni, 2022).

Topic 4: Business model and Market strategy

Marketing strategies bolster omnichannel customer engagement by reciprocating and unifying communication with targeted counterparts over different channels, through big data analytics technology (Bhardwaj et al., 2023; Nguyen et al., 2022; Varadarajan et al., 2022; Lopes et al., 2021). A concise and articulated strategy of extension or restructuring of channels (including digital channels) is designed to avoid channel cannibalization (Bhardwaj & Mohapatra, 2023; Lopes et al., 2021).

Topic 5: Supply chain management

When combined with inventory synchronization and integrated fulfillment processes across channels, supply chain management achieves operational efficiency, agility, and customer satisfaction (Lei et al., 2022; Lawson et al., 2018; Li & Wang, 2023). Before introducing omnichannel, some background information should be provided regarding its distinction from multichannel in the context of demand correlations between channels (Shin et al., 2022). Inventory and fulfillment challenges are addressed via strategies such as ship-from-store (SFS), ship-to-store (STS), and hybrid approaches (Das et al., 2023; Li et al., 2022; Neves-Moreira & Amorim, 2024). BOPIS and OSHDS significantly accelerate delivery speed while efficiently utilizing inventory, necessitating accurate scaling of inventory.

Topic 6: Customer relationship management

CRM is vital to omnichannel strategies and helps in building long-term relationships with customers. Integrative practices (buy-online-return-in-store (BORS) and BOPS)-which indicate channel integration-foster positive customer satisfaction and loyalty (Xie et al., 2023; Li et al., 2024). Through the combined use of omnichannel strategies and technologies, customer responses (affective, pleasure; cognitive, trust; and behavioral, purchase intention, word-of-mouth) are improved (Nawres et al., 2024; Rodríguez-Torrico et al., 2023; Lazaris et al., 2022; Pereira et al., 2023; Tran et al., 2023). It is also important that in-store mobile usage can provide personalization and further enhance customer engagement (Tyrväinen et al., 2020; Zhang et al., 2024).

Topic 7: Promotion and distribution strategies

The promotion and distribution of products are essential for omnichannel engagement and the smooth flow of products (Dhaigude & Mohan, 2023). To balance fulfillment costs and consumer satisfaction, the strategic coordination of distribution channels and promotional activities is required (Wan, 2022; Strong, 2024; Z. Li et al., 2023; Blom et al., 2021). Fundamentally, integrated marketing efforts are crucial for successful omnichannel distribution and promotion strategies (Shankar & Kushwaha, 2021).

Study 2: Fuzzy-TISM analysis on omnichannel strategy

Theoretical lens. *The theories that have been selected as theoretical lens for this analysis are: resource-based theory and Signal Theory.*

The Resource-Based View (RBV) is a key strategic management theory. Its underlying principle states that an organization's resources are essential for achieving and sustaining a competitive advantage (Barney, 1991, Wernerfelt, 1984). In this perspective, unique tangible and intangible resource allow organizations to clearly differentiate themselves from competitors and create value (Peteraf, 1993). These resources include, for example, employee know-how, physical capital, reputation, technological infrastructure, as well as cultural and natural assets (Wernerfelt, 1984).

Applying Resource based theory to the omnichannel context allows to examine how firms can enhance their competitive advantage by leveraging resources to implement an omnichannel strategy.

The Signal Theory examines how individuals and organizations communicate information in the presence of informational asymmetry (Spence, 1978). Communication is based on signals, whose effectiveness and credibility depends on their uniqueness and difficulty to be imitated.

In the context of marketing and consumer behaviour, the Signal Theory has been further developed by Erdem and Swait (2001) who argue that a brand's value is a core signal to consumers, conveying clear messages about the quality and performance of products. The brand itself is a reference point for reliability and perceived quality, thus influencing purchasing decisions.

Applying the Signal Theory to the omnichannel experience, companies aim to reduce informational asymmetry by sending consistent and credible signals across all customer touchpoints.

Methodology. *To answer the three research questions, we utilize a Fuzzy-TISM mainly to identify the relative importance of key factors of both an omnichannel business and omnichannel customer experience, based on the factors identified by previous research employing STM methodology.*

Fuzzy-TISM will also further allow to explore how these themes interact and construct a hierarchy and to better understand the dynamics between them, even in terms of cause-effect relationships, thus building a holistic view of an omnichannel strategy in terms of enablers and outcomes.

The Fuzzy-TISM methodology, proposed by Khatwani et al. (2015) allows to address problems of ambiguity and uncertainty in modelling complex systems, managing the vagueness in the relationships between factors, organizing them hierarchically based on their mutual influence. The result is the creation of a structure that highlights the extent to which the variables affect each other.

Fuzzy-TISM integrates and extends the ISM (Interpretive Structural Modelling) method with fuzzy theory, which allows to assign specific weights to the relationships between variables, capturing the uncertainty and subjectivity in decision-making processes.

Fuzzy-TISM addresses multi-factorial problems and offering a clear visualization of the results by modelling interrelations between factors in a collaborative way. It is indeed a form of enhanced group decision-making that

leverages the different opinions of various experts, enabling to effectively model these varying degrees of consensus on the topic of interest. Based on the above-described characteristics, this methodology is therefore suitable to investigate emerging and still understudied phenomena for which there is room for the development of structured models.

Following Pereira et al. (2024), the application of the Fuzzy-TISM methodology entails the following phases: factors identification, data collection, data analysis.

Factors identification.

We have identified the factors that are deemed to be relevant in explaining the phenomenon under investigation, being able to capture the multifaceted nature off omnichannel strategy. The factors have been extracted from the literature and are presented below.

1. *Alignment of a firm's omnichannel strategy with other strategies, including marketing and its overall strategy, is paramount. Description: A critical point to address is the alignment of the omnichannel strategy with the overall business strategy. This alignment is essential for ensuring the overall success of the business. Specifically, the omnichannel strategy must be coherent with the marketing strategy and the broader organizational goals. It implies the commitment of top management to the omnichannel strategy in order to guarantee the synchronization of operations across different channels (channel coordination). Furthermore, changes in the organizational structure may be required to support omnichannel operations. This strategic alignment may also take place by means of the selection of strategic partnerships (e.g. with technology providers, logistics partners, and other third parties to enhance omnichannel capabilities) as well as the ability to effectively allocate resource (staff, technology, budget) across channels and manage the costs associated with maintaining multiple channels (Maulana et al., 2023, Djofack et al., 2023, Solem et al., 2023).*
2. *Competitiveness in design, development and implementation is important. Description: it is important to examine companies' actions to make their omnichannel strategy competitive. Understanding these practices is key to identifying successful approaches in the market. Such approaches may take various forms, depending on the supply chain management strategy (as discussed in factor 5) (Solem et al., 2023, Djofack et al., 2023, Lazaris et al., 2021).*
3. *The role and selection of technology in supporting the omnichannel strategy is very important for its success. Description: This involves the role and selection of technology in supporting the omnichannel strategy. A thorough evaluation of a company's technological readiness is necessary to determine how effectively technology is leveraged in their omnichannel efforts. Key technological solutions include mobile apps, Big Data, artificial intelligence (AI), machine learning, blockchain, and augmented reality (AR). A coordinated adoption of such technologies has implications for customer experience, inventory management, and logistical efficiency (Alesanco-Llorente et al., 2023, Bag et al., 2023, Cai and Lo, 2020, De Giovanni, 2022).*
4. *A key factor for an organization is its focus on the signals communicated to customers as part of the omnichannel experience.*
   Description: It is crucial to analyse what messages or experiences, as signals, are being transmitted from both internal and external customers, and how these impact customer perception and engagement. This is important for a feedback loop and mechanism for organisations to constantly improve. This theme emphasizes the importance of integrating online and offline channels to offer a seamless and consistent customer experience throughout their interaction journey with a brand. Channel integration is crucial in enhancing customer experience quality. It indeed allows customers to interact with the firm using several touchpoints, moving from one to another in a seamless way (e.g. online research, in-store visits, and social media interactions) (Rahman et al., 2022, Stead et al., 2022). "The omnichannel customer experience implies a synergy between online and offline channels, allowing consumers to transition smoothly from one channel to another during the research, purchase, and post-sale phases" (Palazón et al., 2022). An omnichannel firm makes an effort to guarantee seamlessness across channels, a high channel integration quality by means of synergistic use of touchpoints, personalization of experiences across different channels and a proper response time in terms of both service provision and communication with customers.
5. *The integration and management of the supply chain in the context of an omnichannel strategy is important. Description: Effective supply chain integration and management plays a pivotal role in ensuring the smooth functioning of the omnichannel strategy. Effective supply chain management is essential in omnichannel strategies to ensure speed, convenience, and product availability (Lei et al., 2022). Real-time synchronization of inventory levels and order fulfilment processes across physical and digital channels is essential. Strategies such as "ship-from-store" (SFS) and dedicated fulfilment centers optimize inventory management and delivery (Das et al., 2023, Lawson et al., 2018, Shin et al., 2022).*

Specific logistics solutions can include: ship from store (SFS), Shipped from online logistics centers (SFO), Ship-to-store (STS), Hybrid SFO+SFS, SFO+STS, SFS+STS. Possible inventory solutions are Buy-online-pickup-in-store (BOPIS) or Out-of-stock-home-delivery-service (OSHDS). What is important is also the degree of synchronization between suppliers and the retailer to meet omnichannel demands.

6. *The performance measurement of the omnichannel strategy is of primary importance for its success. Description: Establishing a feedback loop is essential for continually improving products or services based on customer interactions across multiple channels. This factor refers to performance measures in a broad sense, including sales growth, improved supply chain management, competitive advantage, improvement in operations, innovation*

ambidexerity, improved reputation, improved perception by customers and employees (Asmare and Zewdie, 2022, Abadie et al., 2023, Li et al., 2023).

7. *Companies need to address how they measure customer relationships through the rich omnichannel strategy generated data. Description: This is a critical component for optimizing increasingly data-driven strategies, ensuring that insights derived from customer behavior inform future decisions. Relevant data for this purpose concern affective, cognitive, and behavioral responses, purchase patterns (buying behaviours across different channels), customer satisfaction, customer loyalty, customer retention (Lazaris et al., 2022, Li and Wang, 2023, Nawres et al., 2024, Pereira et al., 2023, Rodríguez-Torrico et al., 2023, Tran et al., 2023, Tyrväinen et al., 2020, Zhang et al., 2024).*

Data collection.

Based on these factors, data on experts' opinions are collected. This phase of data collection is still ongoing. We have identified a sample of 15 experts on the topic of omnichannel at an international level, to whom a questionnaire has been administered. The questionnaire has been developed based on the 7 identified factors.

The questionnaire consists in asking experts opinions about the existence of a relationship between all the possible pairs of variables (Yes or No) and, if yes, asking them in what way they influence each other and what is the strength of the relationship (from 0 to 1: (1= full relationship, .9= very high relationship, .7=high relationship, .5= medium relationship, .3= low relationship, .1= very low relationship and 0= no relationship).

Expected results. *Data will be analysed for the creation of a reachability matrix. Subsequently, the matrix is defuzzifyed and dependent and independent variables are identified, to be able to identify the links between them.*

Utilising the results obtained, we will proceed to create a MICMAC graph that effectively separates the variables representing the driving linkages and autonomous clusters.

In the final step, a Fuzzy-TISM digraph will be created to visually represent the study variables in levels and establish the connections between these variables based on the strength of their association.

Managerial implications. *The work has important managerial implications. A broad understanding of omnichannel phenomenon, its pillars and their mutual influence is a key input for strategic decisions concerning the implementation of omnichannel strategy, which implies managerial commitment and investments.*

Originality of the paper. *The goal of the two studies included in this paper is to shed new light on the omnichannel phenomenon. The literature review highlighst the most frequently discussed topics in omnichannel literature: Customer experience and journey, Online-offline integration models and financial strategies, Technology management, Market strategy, Supply chain management, Customer relationship management and Promotion and distribution strategies. Some of the topics can be considered as belonging to a customer perspective, while others are more business and strategy oriented. The Fuzzy-TISM study has instead the goal to clarify the relationships between variables, leveraging the perceptions of the surveyed managers and experts.*

Key words: *omnichannel, customer experience, Fuzzy-TISM, Entrepreneurial decision making, digital transformation.*

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“Online or offline? That is the question” The wine distribution channels dilemma

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Abstract

This paper aims, with an exploratory approach, at understanding which variables affect wine consumers when they opt for online or offline purchasing channels decisions. In order to do so, in this study authors carry out a comparative analysis between the wine preferences of Italian and Chinese consumers. The examination of the reasons behind purchasing or not purchasing wine online or via social media among Chinese and Italian consumers reveals some interesting similarities in the factors influencing their decisions.

Framing of the research. *The global wine industry is continuously expanding, with more consumers showing interest in exploring and appreciating various wine varieties from all over the world. One of the most notable emerging markets in this sector is China, a country with a long history of producing and consuming alcoholic beverages, which is now undergoing a significant transformation in the wine industry. In this context, Spanish wine has become one of the leading players in wine imports to China. According to Jimenez-Asenjo et al. (2019), the increasing globalization has encouraged both multinational corporations and smaller businesses to explore new and promising markets like China, with a particular focus on Spanish wines being exported to the region. The research on international marketing strategies of Spanish wine producers in China suggests that these companies do not take extreme approaches of either complete market adaptation or full standardization of their marketing strategies. It further points out that full standardization is primarily driven by internal factors related to business strategy, while adapting to the Chinese market is mainly influenced by external factors such as consumer behavior, distribution systems, and legal and socio-cultural environments. As a result, companies must employ both strategies simultaneously. A key challenge for businesses entering the Chinese market is gaining access to market information and distribution channels, as these are still underdeveloped. Due to the wide range of available brands, selecting and purchasing wine can be a complicated process for consumers. Therefore, it is crucial for marketers to understand what influences consumers when selecting wine and the reasons behind their purchasing decisions. Corsi, Cohen, and Lockshin (2015) expanded on Goodman’s (2009) research, which used the Best-Worst Scaling method, to examine whether the factors influencing wine choices differ based on where it is purchased or the occasion it is consumed. The study found that prior tasting experience is the most significant factor in wine selection, and the occasion of consumption has a stronger influence on wine choice than the retail channel. Later, Corsi, Cohen, and Lockshin (2017) built on these findings by using a Discrete Choice Experiment (DCE) to analyze Chinese consumers’ decisions when presented with wine bottles containing manipulated attributes. They found that factors such as the wine's origin and price were crucial in consumers’ decisions, with significant variations based on the consumption occasion. In Lockshin et al.’s (2017) study, several research methods were employed to gather data, including Check-All-That-Apply (CATA), Best-Worst Scaling (BWS), Discrete Choice Experiments (DCE), and Likert scales. These methods helped to assess consumers' knowledge of wine-producing countries, regions, and grape varieties, as well as their reasons for drinking wine. The primary motivations among Chinese consumers for drinking wine were related to health and relaxation. Best-Worst Scaling was also used to identify key attributes in wine selection depending on whether it was consumed on-site or off-site. Quality indicators and grape variety were found to be crucial in retail wine selection, while on-site consumption was more influenced by word of mouth and food pairings. An interesting finding was the growing trend of drinking wine during informal occasions, such as meals and casual evenings, highlighting a shift in wine consumption habits in China. In conclusion, the CWB provided a detailed understanding of Chinese consumers' preferences and behaviors regarding wine, showing that techniques like CATA and BWS are more effective in capturing these behaviors compared to traditional scale-based methods. This study also addressed the challenge of understanding Chinese consumers’ wine preferences, considering the cultural and linguistic differences. It investigated whether Chinese consumers preferred to use Western-standard terminology or Chinese terms to describe the aroma and taste of wine.*

Purpose of the paper. *The main objective of this analysis is to compare the obtained results with those from a similar study conducted among Chinese consumers by researchers, as well as with the theories presented in the scientific*

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literature regarding Italian consumers, in order to assess whether there is a convergence between the collected empirical evidence.

Methodology. *The researchers conducted a survey with a group of Italian consumers. A key aspect of this study is to carry out a comparative analysis between the wine preferences of Italian and Chinese consumers. By exploring both the differences and similarities, this analysis will offer valuable insights into the wine preferences of two distinct cultural backgrounds, both of which have deep-rooted wine traditions, but vary in several ways. The Italian wine market is quite complex, both in terms of production and demand. The wine industry is highly fragmented, with numerous small businesses that are closely tied to regional and local winemaking traditions. Additionally, the factors influencing consumer preferences are shifting, aligning with new lifestyles, and the marketing efforts of wine producers appear to have limited impact. The purpose of the questionnaire is to perform an empirical analysis of Italian consumers' purchasing preferences. The survey will examine their buying choices across three different contexts: offline purchases, online purchases, and purchases made through social media. The data gathered from this survey will be compared to information already collected on wine purchase decisions in China. The sample consists of 150 individuals, both male (36%) and female, all Italian nationals and aged between 20 and 74 years, with an average age of 36. To better understand the key factors behind wine purchasing decisions, a variety of extrinsic and sensory attributes were considered, such as grape variety, region of origin, geographical indication, aroma/bouquet, alcohol content, color, food pairings, wine characteristics described on the label, bottle shape, brand and label appearance, and price-quality ratio. Each respondent was asked to rate the importance of each wine attribute on a 5-point scale, where 1 meant "not important at all" and 5 meant "extremely important." The authors also applied regression analysis to interpret the results.*

Results. *The current study shows that 131 participants consume or purchase wine, while the remaining 19 do not. The majority of the respondents are female. Half of the participants have an average level of education, while 45% have a university degree. The average age is 36, with ages ranging from 20 to 74. Most of the respondents are employed (52%). Additionally, when making purchase decisions, many participants rely on recommendations from a restaurant or retailer as trustworthy sources of guidance. Television programs, on the other hand, are considered unreliable by most respondents, while the internet seems to be a useful communication tool for 23% of the participants. 77% of the respondents buy wine offline, in retail stores. Consumers tend to have clear, well-defined opinions (low uncertainty) about the importance of factors such as the complexity and taste of the wine, aroma/bouquet, price-quality ratio, region of origin, and food pairings. The shape of the bottle, television advice, and online reviews are considered less important attributes. The wine characteristics were then classified into five groups:*

G1: Food pairing, aroma/bouquet, wine taste, and price-quality ratio. This cluster includes the price and a mix of sensory features that are most important to consumers.

G2: Grape variety and region of origin. The grape variety is often linked to sensory differences between wines that can be highly appreciated. Similarly, the region of origin, being closely tied to the grape varieties, tends to reinforce consumers' expectations about the quality of the wine.

G3: Label information, alcohol content, color, and overall pleasantness of the beverage. This cluster refers to packaging-related aspects that are considered important attributes. The brand is considered quite relevant, despite the large number of brands due to the significant fragmentation of the Italian wine industry, which includes around 6,000 companies.

G4: Bottle shape: considered a less significant driver.

G5: Geographical indication status. Geographical denominations are seen as very important for several reasons: they connect the wine to a specific region, which can influence quality perceptions; they are regulated by strict wine laws that ensure high-quality standards; they imply sensory differences in the wine, such as taste, aroma, and structure, which may be important for consumers seeking unique wine experiences; and they help preserve and promote local culture and native grape varieties. This can be a point of pride for Italian consumers who value the diversity and authenticity of regional wines.

Consumption occasions play a significant role in wine selection. Consumers tend to choose wines based on the context in which they will be consumed. A growing trend has been observed in consuming wine on informal occasions: 47% of respondents prefer to drink wine at home, during a dinner with friends, for an aperitif, or in a wine bar, while 38% prefer to drink wine during special occasions. Regarding the place of purchase, almost half of the participants buy wine in supermarkets or at wine bars/wine shops, while 48% buy it occasionally in person. 43% consume wine at least once a week. The most important motivations for wine purchases among this sample of respondents are "taste and pleasure" and consuming it "on special occasions with friends/family." Only 23% of participants purchase wine online; those who do prefer this channel because of the wide selection of wines, the availability of special offers and discounts, and the time-saving aspect. Most respondents who buy wine online use e-commerce sites (e.g., Amazon), and only 11% buy through social media. It can be said that consumers may be skeptical about purchasing wine online and via social media for several reasons:

Wine tasting is a multisensory experience involving sight, smell, and taste. Buyers may be concerned that online purchases do not allow them to evaluate the wine directly before purchasing.

The inability to physically inspect the wine can raise concerns about its quality, as consumers may doubt its origin, freshness, and integrity.Wine purchases require some level of knowledge and expertise. Consumers may feel uncertain about selecting wines online, especially if they are unfamiliar with the brand or grape variety.

Purchasing wine online or through social media requires sharing personal and financial information. Some consumers may be concerned about the security of their data.

Direct interaction with an expert in a physical store can be reassuring. Online shopping may lack this support and advisory dimension. Some consumers may worry about encountering dishonest sellers or counterfeit wines.

Despite these concerns, many wine buyers trust online purchasing and information from social media. Companies are attempting to address these concerns through marketing strategies, offering reviews and ratings, providing detailed product descriptions, and ensuring reliable delivery.

OFFLINE: MOST RELEVANT ATTRIBUTES

CHINESE CONSUMERS	ITALIAN CONSUMERS
Brand name	*Word of mouth*
Previous tasting	*Brand name*
Region of origin of the wine	*Previous tasting*
Occasion of consumption	*Region of origin*
Price	*Occasion of consumption*
Grape variety	*Price-quality ratio*
Food pairing	*Grape variety*
Recommendations from friends and family	*Food pairing*
Quality indicators	*Recommendations from friends and family*
	Advice from retailers and restaurateurs
	Attractive label
	Alcohol content
	Color
	Pleasantness of the drink
	Protected geographical status
	Aroma/bouquet
	Taste of the wine

OFFLINE: LESS RELEVANT ATTRIBUTES

CHINESE CONSUMERS	ITALIAN CONSUMERS
Alcohol content	*Bottle shape*
Attractive label	
Shelf information	

One key finding from our analysis is that there are both significant similarities and differences in the preferences of Chinese and Italian consumers when it comes to offline wine purchases.

On one hand, it's interesting to see that both groups share many of the same factors they consider important when deciding which wine to buy. This alignment could suggest a trend of globalized wine preferences, where consumers from different cultural backgrounds value similar qualities in wines.

On the other hand, a major difference lies in how many attributes each group deems important. While Chinese consumers focus on fewer key factors, Italian buyers tend to consider a broader range of characteristics when selecting a wine. This might reflect cultural differences or a more refined approach among Italians in assessing wines.

Moreover, it's notable that Chinese consumers assign less importance to certain attributes compared to their Italian counterparts and don't have any shared traits among those they consider less important. This could be interpreted as a result of differences in winemaking traditions, consumption habits, or even how wine is viewed as a product in each culture.

Reasons for Purchasing Online or Through Social Media

Chinese Consumers	Italian Consumers
Time savings	*Time savings*
Convenience	*Convenience*
More information	*More information*
Read others' experiences	*Read others' experiences*
Easier to find specific products	*Wide selection of wines*
Receive recommendations	*Receive recommendations*
Ability to shop at any time of the day	*Shop at any time*
Greater flexibility	*Special offers and online discounts*

Reasons for Not Purchasing Online or Through Social Media

Chinese Consumers	Italian Consumers
Difficulty in evaluating a product based on a photo	*Difficulty in evaluating a product based on a photo*
Security of payment card data	*Security of payment card data*
Lack of trust	*Prefer human interaction*
Cannot taste the wine	*Concerns about delivery methods*

The examination of the reasons behind purchasing or not purchasing wine online or via social media among Chinese and Italian consumers reveals some interesting similarities in the factors influencing their decisions. Both groups are driven by considerations like convenience, a wide range of choices, and access to detailed product information. However, there is a noticeable pattern of distrust towards these purchasing methods. This skepticism may stem from concerns about the security of online transactions, the potential for fraud, or doubts about the quality of the products received. This mistrust forms a major obstacle to the widespread use of online and social media wine purchases. A key point to highlight is that, despite the similar motivations, the ongoing mistrust suggests a gap between consumers' interest and their actual willingness to buy. This gap might be the result of a lack of confidence in online security or negative past experiences with online shopping. To encourage more consumers to embrace online and social media wine purchases, addressing these concerns about security and trust is essential. Tailored marketing and communication efforts that emphasize transparency, reliability, and secure transactions could help break down these barriers and improve consumer perceptions of these purchasing channels.

A comparison between the scientific literature and the findings of this survey.

Relevant attributes		**Less relevant attributes**	
Literature:	***Our survey:***	***Literature***	***Our survey***
Taste/aroma	*Aroma/Bouquet*	*Bottle shape*	*Bottle shape*
Price	*Quality/Price ratio*	*Label*	
	Region of origin	*Brand name*	
	Brand name		
	Previous tasting		
	Occasion of consumption		
	Grape variety		
	Food pairing		
	Recommendations from friends and family		
	Recommendations from store owners and restaurant owners		
	Alcohol content		
	Color		
	Drinkability		
	Protected geographical status		
	Attractive label		
	Taste of the wine		

The examination of Italian consumers' preferences when buying wine has highlighted an interesting difference from what the existing literature suggests. While previous studies show that Italian consumers focus on only a few key attributes, our research found that a much wider range of factors influence their purchasing decisions. This difference could be due to a change in the wine market dynamics, where Italian consumers have become more sophisticated and now consider a broader range of attributes when choosing wine. Alternatively, it might indicate that earlier research doesn't fully reflect the current preferences and behaviors of Italian wine buyers. One important point of divergence is in the less important attributes. While the literature identifies a specific set of attributes as less significant, our study found that only one of these is shared between the two. This discrepancy could mean that the literature overlooks certain factors that are actually important to Italian consumers, or that the market is evolving, making some attributes that were once considered irrelevant now seem less important.

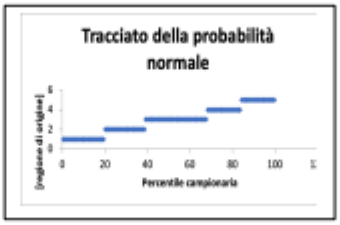
Regression Analysis

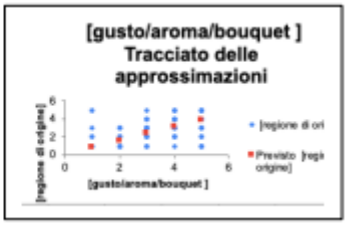
We conducted a further comparative analysis using regression, a statistical method that helps us understand how one variable (such as a wine attribute, for example, price) can influence another variable (such as taste). It allows us to discover whether there is a relationship or connection between the characteristics of the wine and the actual choices made by consumers.

Regression between: Region of Origin and Taste/Aroma/Bouquet

The values indicate that the regression model has a high ability to explain and predict the variation of the dependent variable (region of origin) in relation to the independent variable (taste/aroma/bouquet). A high R-squared suggests that a significant portion of the variation in the dependent variable is explained by the independent variable in the model. However, the standard error indicates that the model's predictions could deviate, on average, by about 1.33 units from the actual observed values. The analysis of variance suggests that the regression model is highly significant. Most of the variation is explained by the model, as the sum of the residual squares is relatively low compared to the total sum of squares.

Statistica della regressione	
R multiplo	0,909752
R al quadrato	0,82765
R al quadrato corretto	0,819957
Errore standard	1,327385
Osservazioni	131



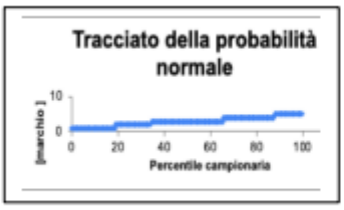


Regression between: Price and Brand

The results show that the regression model is effective in explaining and predicting changes in the dependent variable (price) based on the independent variable (brand). A high R-squared value indicates that a significant portion of the variation in the dependent variable is explained by the independent variable in the model. However, the standard error suggests that the model's predictions may differ from the actual values by an average of approximately 1.42 units.

The variance analysis suggests that the regression model is statistically significant, meaning the model explains most of the variation. This is evident as the residual sum of squares is relatively low compared to the total sum of squares.

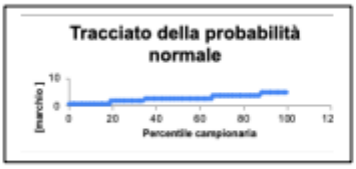
Statistica della regressione	
R multiplo	0,897041191
R al quadrato	0,804682898
R al quadrato corretto	0,79699059
Errore standard	131
Osservazioni	131

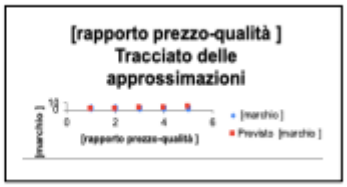


Regression between: Taste/Aroma/Bouquet and Color

The results show that the regression model is effective in explaining and predicting changes in the dependent variable based on the independent variable. A high R-squared value indicates that a large portion of the variation in the dependent variable is accounted for by the independent variables in the model. However, the standard error suggests that the model's predictions may deviate from the actual values by an average of approximately 1.11 units. The variance analysis indicates that the regression model is statistically significant, meaning that the model explains most of the variation. This is evident as the residual sum of squares is relatively low when compared to the total sum of squares.

Statistica della regressione	
R multiplo	0,897041191
R al quadrato	0,804682898
R al quadrato corretto	0,79699059
Errore standard	131
Osservazioni	131





Research limitations. *This study is not without limitations, especially considering that it is still in its initial stages. First and foremost, the sample size is still too small to be fully representative of the Italian population. This suggests that the sample should be expanded for further development of the paper. Additionally, it is important to note that the comparison was made between the results of the questionnaire administered to the sample of Italian consumers and the data available in the literature regarding Chinese consumers.*

Managerial implications. *Based on the analyses carried out and the challenges encountered throughout this research, it's clear that understanding the preferences of Italian and Chinese consumers when buying wine is an area that is constantly evolving. Contrary to the limited insights offered by existing scientific literature, the findings from this study show a wide range of factors that Italian consumers consider important. This suggests that the wine market is undergoing significant changes, with consumers now paying more attention to details that may have been overlooked before. The difference between the attributes considered less important in the literature and those highlighted in this research raises important questions. It points to the possibility that consumer preferences are evolving or that the complexity of the Italian wine market has not been fully captured by previous studies. The way we understand consumption patterns must therefore be continuously updated to keep pace with these shifts. Moreover, the overall skepticism towards buying wine online or through social media, shared by both Chinese and Italian consumers, highlights a major obstacle in embracing these purchasing channels. Concerns over online security and product quality are key barriers that require targeted strategies from those in the wine industry. To conclude, this study suggests that understanding consumer preferences in the wine industry requires an adaptive approach that stays attuned to emerging trends in consumer behavior. The differences observed from other studies emphasize the importance of continuously reevaluating marketing*

strategies and industry practices in order to better meet the evolving needs and complex cultural and market dynamics within the wine sector.

Originality of the paper. *The originality of this research paper is the comparison between two different countries (Italy and China) for a specific product, which is wine, usually compared for other kinds of products.*

Key words: *Wine, Italy, China, Consumers, Channels, Online environments*

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Assuring Supply Chain Resilience in the aeronautic industry: a Total Cost of Ownership perspective

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Abstract

Supply chain projects in the aeronautic industry are characterized by a complex set of interrelated activities oriented toward the achievement of specific objectives, such as efficiency, responsiveness and quality (Ward, 1999; Jaafari, 2001). In nowadays complex competitive scenarios - highly characterized by uncertainty, risks, and high level of servitizations - assuring Supply Chain RESilience (SCRES) becomes vital. In the aeronautic industry, this is particularly true not only by considering the complexity of the product itself (namely, the aircraft's production and delivery) but also in the perspective of its entire life cycle, addressing all the post-sales services (da Silva et al., 2020; Mohammadi, 2020; Singh & Hong, 2020; Saputro et al., 2022). Hence, a comprehensive assessment of risks and vulnerabilities along the entire life cycle of the aircraft represents a Supply Chain Management (SCM) challenge that has been only partially explored (Camara et al., 2016). In this study, we aim to address this research gap by investigating - with a qualitative approach, based on a case study - the challenges and opportunities of Project Risk Management (PRM), Supply Chain Risk Management (SCRM) and SCRES in the aeronautic industry under the lens of Total Cost of Ownership (TCO) (Brad et al., 2018).

Framing the research. *Although the existence of a link between Project Risk Management (PRM), Supply Chain Risk Management (SCRM), and Supply Chain RESilience (SCRES) has been recognized in the literature (Sauer et al., 2022), few studies have explored, in practice, how to assess risks and vulnerabilities along the entire life cycle of an aeronautic 'product', namely an aircraft, considering the processes of Supply Chain Management (SCM) and all the services related to the of post-sales phase, within the entire life cycle of the aircraft under the perspective of the Total Cost of Ownership (TCO) (Camara et al., 2016).*

Project Risk Management (PRM), Supply Chain Risk Management (SCRM) and Supply Chain RESilience (SCRES) in the aeronautic industry

The aeronautics and defense sector includes all companies that produce, distribute and use aircraft for commercial, defense and space exploration purposes. The value chain in the aeronautics sector is fragmented and heterogeneous, and it is composed by a series of activities and services - from design to after-sales market - necessary to move from the conception of the project to the placement of the aeronautical product on the final market and its functionality along the years, so it concerns activities and services linked to assistance and after-sales services (Bolatto & Frigero, 2014). The output is a product-service composition, a complete solution, and in cases like that it became evident that selling spare parts and after-sales services conducting repairs; installing upgrades; reconditioning equipment; carrying out inspections and day-to-day maintenance; offering technical support, consulting, and training; and arranging financescould be a bountiful source of revenues and profits as well (Cohen et al., 2006).

The aeronautic sector presents complex characteristics and challenges, such as high technological level, product complexity, increasing development costs, long break-even periods and small markets, cash flow issues, high interdependencies between civil and defence markets, and most of all it is a strategic industry; these aspects have a strong influence on the organisations strategic decisions regarding the localisation of activities, the relations among supply chain actors and governments, and SCM as a while (European Commission, 2009). These aspects are strongly related to Project Risk Management (PRM) and Supply Chain Risk Management (SCRM) (Li et al., 2015; Ahn et al., 2018; Guerra et al., 2024). For this reason, the aeronautic industry represents and exemplar case to address the issues above-mentioned and to suggest potential comparisons across different sectors.

PRM is an important lens to adopt in project planning, with the potential to influence project design as well as activity-based plans on a routine basis, occasionally influencing very basic issues like the nature of the project parties and their objectives for the project. So even if it is usually associated with the development and evaluation of contingency plans

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supporting activity-based plans, a real effective PRM will be essential in the development of the entire project (the so-called 'base plan') and the related contingency plans[3] (Chapman, 2003).

SCRM is aimed at developing strategies for the identification, assessment, treatment, and monitoring of different risks in supply chains (Neiger et al., 2009; Tummala and Schoenherr, 2011; Ho et al., 2015). It has several definitions that all have emphasized collaboration with supply chain partners, but in particular we may refer to "an inter-organisational collaborative endeavour utilising quantitative and qualitative risk management methodologies to identify, evaluate, mitigate and monitor unexpected macro and micro level events or conditions, which might adversely impact any part of a supply chain" (Ho et al., 2015, p. 5036).

Traditionally, aeronautic manufacturers have internally managed most of the risk associated with innovation, development and production (Williams et al., 2002). However, the sector has been developing a complex evolutionary path towards a network approach based on strong long-term relationships and risk sharing mechanisms among the supply chain actors (Rose-Anderssen et al., 2008; Kamsu-Foguem, 2023).

In fact, in the aerospace supply chain risk-sharing partnerships are largely used for enhancing innovation and competitive advantage, allowing for efficiency, timeliness and financial strength that go beyond the limited capacity of a firm working alone (Raj Sinha et al., 2004; Rose-Anderssen et al., 2008; Tang et al., 2009). Despite these advantages, the network of relationships can also become a source of risk and vulnerabilities that might come from suppliers (Gupta et al., 2015; Kamsu-Foguem et al., 2023) and customers during the post-sales phases (Brad et al., 2018).

The Supply Chain RESilience (SCRES) definition typically measures the "magnitude of disturbance" the system can absorb before it changes its structure by changing the processes and variables that control behavior, comprehending both the "engineering resilience" and the "ecological resilience" perspectives (Wieland, 2020).

The SCRES literature has also largely analyzed and categorized those SCRES strategies that may contribute to ensuring resilience and better performance (Um and Han, 2020; Gaudenzi et al, 2023), underlining SCRES enablers, such as agility, information sharing, collaboration, visibility, risk sharing, risk-management culture, adaptive capability (Soni et al., 2014) to cite a few examples that are largely coherent with the key strategic challenges of the aeronautic industry.

After sales and Total Cost of Ownership (TCO) in the aeronautic industry

After-sales services are activities during warranty periods that include field technical assistance, spare parts distribution, customer care, and accessories sale; aftermarket support involves secondary market transactions for additional products (e.g. accessories and add-ons) and product recovery processes (Durugbo, 2020). An aftermarket support is a network of resources (material, people and infrastructure) for after-sales services, secondary market transactions and product recovery processes. This definition expatiates on various business-to-business interactions and relationships in the aftermarket. It attempts to conceptualise the business ecosystems of aftermarkets which include different aspects (Durugbo, 2020), such as actors, i.e. customers, Original Equipment Manufacturers (OEMs), suppliers and competitors (Wagner et al., 2018; 2012) and different aftermarket areas highlighted in the literature, such as the after-sales market (Kranenburg and Van Houtum), returns (Akturk et al., 2018), spares (Snyder, 1993), and field service (Saccani et al. 2007; Schulze et al., 2012). After-sales and also aftermarkets are significant revenue streams for most of the industrial companies (Kirkizoğlu & Karaer, 2022), also for the aeronautic one (Durugbo, 2020). Aftermarket goods and services constitute a significant source of revenue and profit for manufacturers. An awareness of the potentials of both concepts is evident by the extensive body of production and operations management (POM) publications that investigate the perspectives of both academia and practitioners, but not few in aerospace (Durugbo, 2020). In the aerospace industry, maintenance, repair and overhaul (MRO) services are normally provided during product usage. Given that an airplane is a durable product with a life span of over 30 years, opportunities abound in aviation maintenance, repair and overhaul. The profitability of the aviation industry is not just from the sale of aircrafts, but also from maintaining them for an anticipated lifespan (Zhu et al., 2012). In this industry in particular, the concept of "through-life management" involving the provision of a complex combination of products and services over extremely long life-cycles, has been widely advocated, particularly in the defence aerospace arena, meaning the life-cycle management of the products, services and activities required to deliver a fully integrated capability to the customer, while reducing the cost of ownership for the customer (Ward & Graves, 2007).

The Total Cost of Ownership (TCO) is a methodology that estimates the cost of a product or an action by going beyond the mere purchase price, and including several other purchase-related and/or service-related costs and challenges (Bhutta and Huq, 2002; Brad et al., 2018). TCO can focus on understanding the overall cost of doing business with a respective supplier or customer, and TCO of the supply chain computes the overall cost of a good or service from an entire end-to-end supply chain perspective (Ellram, 1996, 1993). This means that it includes the cost from the idea of the product/service, such as the cost of working with a supplier or customer to develop a new or improved product and service

[3] 'Base plans' are target scenarios, a portrayal of how we would like a project to go, incorporating proactive responses to uncertainty, they provide a basis for project preparation, execution, and control. 'Contingency plans' are a second level of plan, a portrayal of how we would like to respond to threats or opportunities associated with a base plan, incorporating reactive responses to uncertainty (Chapman, 2003).

(Brad et al., 2018; Heilala et al., 2006). The use of TCO as an approach for integrating PRM, SCRM and SCRES is presented by Gaudenzi et al. (2021), which analyze some costs and risk elements associated with the SCM processed, enriching the approaches for managing the risks within the pre-transaction, transaction and post-transaction phases. Through a TCO approach, the analysis of the cost components and risks reveals many additional challenges arising beyond the optimization of procurement, production and delivery processes such as for example the costs and risk related to post-transactions and post-sales phases.

Purpose of the paper. *In this exploratory study, we aim at investigating the complex and less-explored relationship between PRM, SCRM and SCRES outcomes under the perspective of TCO theory. Following an inductive approach, based on a case study in the aeronautic industry, theorizing arises from qualitative data, according to a 'bottom up' approach. The Research Questions (RQs) of the study are therefore the following:*

- *RQ1: What are the approaches/practices adopted by aeronautic industry companies towards PRM, SCRM and SCRES along the aircraft product life cycle?*
- *RQ2: How do PRM and SCRES practices influence SCRES outcomes in the different phases of the aircraft life cycle, including the after-sales phase?*

Methodology. *The unit of analysis is focused on the aeronautic industry, investigating the relationships between PRM, SCRM and SCRES along the different phases of the aircraft life cycle under the lens of TCO theory. An aeronautic manufacturer operating worldwide can offer a rich base of information (Flyvbjerg, 2006) for two main reasons. First, the themes of risk management, resilience and servitization along the product life cycle represent a key priority in the aeronautic industry that is also a key theme for global supply chains in different sectors, allowing a potential cross-industries comparision. Second, the aeronautic industry represents an interesting sector for exploring the complex balance between service management and resilience (Kamsu-Foguem et al, 2023). In the data collection process, we are involving senior supply chain managers from aeronautic industry with expertise in PRM, SCRES and SCRM.*

We aim to collect data within a first pilot test to validate the clarity of the protocol of the interview. After this phase, we aim to proceed with interviews according to robust qualitative research methodology. We are also collecting other secondary sources of data for our analysis, such as industry reports and additional information provided by the respondents, to achieve a rich base of information. All interviews will be recorded and transcribed.

Results. *A within-case analysis, which is still in progress, will allow us to identify and organize themes emerging from the transcripts. Relevant literature was incorporated at this stage to support the definition of themes and to provide an additional source of validation (Eisenhardt, 1989). We will present the results during the Conference.*

Research limitations. *In this version of the research, the main limitation arises from the adoption of a single case study methodology. Future research should develop further case studies across different industries to enrich the data and the results.*

Managerial implications. *This study will generate managerial implications on how challenges and opportunities of PRM, SCRM and SCRES may drive innovation in the aeronautic industry under the lens of Total Cost of Ownerhsip theory.*

Originality of the paper. *Due to the complexity of modern supply chains with several stages and multitudes of suppliers, each event occurring at any stage may detrimentally affect the performance and profitability of firms. This is why risk and vulnerability need to be assessed, mitigated and continuously monitored to protect the business before and after the sale of the product. However, not all the risks can be avoided, given the limited resources of companies for managing supply chain risk. Therefore a thorough assessment of project risk and supply chain risk is crucial in order to better estimate the company's risk exposure and determine the priority of potential threats to supply continuity and profitability in order to manage risk is a cost effective manner, considering the entire product life cycle, hence including the post-sales services. Even, in some cases it is useful for a company to continue to bear some risks, in order to capture opportunities that uncertainty may create. The qualitative and quantitative analytic approaches to PRM and SCRM before the sale and in the post-sale stage allow to better consider the complexity of SCRM and SCRES.*

Key words: *supply chain risk, supply chain resilience, total cost of ownership, case studies, aeronautic industry*

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Track 13
Sustainability

Implementing ESG Criteria in Italian SMEs: Regulatory Challenges and the Role of Innovative Digital Tools in the Context of the CSRD Directive

GIOVANNI SPATOLA[1] MARIO D'AVINO[2]

Abstract

This paper analyses the organizational, operational, and regulatory challenges faced by Italian Small and Medium Enterprises (SMEs) in implementing Environmental, Social, and Governance (ESG) criteria, specifically in light of the European Union's Corporate Sustainability Reporting Directive (CSRD). By adopting the Technology-Organization-Environment (TOE) framework, this research aims to better understand the determinants influencing ESG adoption processes within SMEs. Furthermore, the paper explores how innovative digital tools, particularly the AWorld smartphone app, can mitigate these challenges by streamlining ESG data management, enhancing stakeholder engagement, and supporting the internal organizational learning process. Using a qualitative methodology combining a comprehensive literature review, exploratory case analysis, and planned empirical data collection through semi-structured interviews, the study seeks to establish both theoretical insights and actionable managerial recommendations. Expected findings indicate that digital tools significantly facilitate ESG compliance and strategic integration, ultimately strengthening SMEs' competitive positioning.

Framing of the research. *Sustainability has become a critical strategic issue for businesses worldwide, with Environmental, Social, and Governance (ESG) criteria increasingly influencing corporate performance, stakeholder engagement, and long-term value creation (Ahmad et al., 2023). In line with this global trend, the European Union introduced the Corporate Sustainability Reporting Directive (CSRD), mandating comprehensive ESG disclosures and significantly expanding the regulatory framework for corporate sustainability reporting (Capasso & Lattarulo, 2023).*

Small and Medium Enterprises (SMEs), dominant in the Italian economic landscape, face unique resource constraints and organizational limitations, complicating their ESG implementation processes. SMEs often lack the financial resources, specialized skills, and structured governance frameworks required to effectively manage complex ESG reporting requirements (Barro et al., 2024). Moreover, the CSRD directive places additional pressure on SMEs, requiring sophisticated data collection and reporting methodologies that typically exceed SMEs' internal capabilities (Alsayegh et al., 2020). Digital technologies, particularly AI-informed digital platforms, offer promising solutions to overcome these compliance challenges. Platforms such as AWorld provide SMEs with intuitive solutions for managing ESG data, streamlining reporting processes, and improving stakeholder transparency and engagement (Dablander et al., 2025).

Yet, despite their potential, the practical impacts of such digital solutions within SMEs remain underexplored in the context of ESG implementation.

Purpose of the paper. *The research adopts the Technology-Organization-Environment (TOE) theoretical framework (Tornatzky & Fleischer, 1990) to explore and clarify the factors influencing ESG adoption in SMEs. Specifically, the TOE framework allows for examining the technological context (digital platforms like AWorld), organizational context (SME-specific resources, governance, and culture), and environmental context (regulatory pressures from CSRD).*

Thus, the paper addresses two main objectives:

1. *To identify the regulatory, methodological, and operational challenges faced by Italian SMEs in ESG compliance under CSRD.*
2. *To investigate the extent to which digital ESG platforms, notably AWorld, can support SMEs in overcoming these barriers and leveraging ESG for competitive differentiation.*

The research seeks to answer two main questions:

RQ1: How do technological, organizational, and environmental factors influence Italian SMEs' ability to effectively comply with ESG criteria mandated by the CSRD directive?

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RQ2: What are the practical impacts of adopting digital platforms, such as AWorld, on SMEs' ESG reporting processes and internal sustainability practices?

Methodology. *Given the exploratory nature of this research, a qualitative approach structured in three clear phases is employed:*

1. *Literature and Regulatory Framework Review*
   The initial phase involves an extensive review of existing ESG literature, regulatory documents related to CSRD, and SMEs' sustainability practices. This literature review clarifies key regulatory requirements, organizational factors impacting SMEs, and technological opportunities provided by digital ESG platforms (Sood & Özen, 2024; Barro et al., 2024).
2. *Exploratory Case Analysis of the AWorld Digital Platform*
   This phase provides a detailed exploratory analysis of the functionalities and expected benefits of the AWorld platform. Drawing on available documentation and preliminary evidence, this analysis explores how SMEs could practically benefit from AWorld's AI-informed features, automated data management, and interactive stakeholder engagement tools (Dablander et al., 2025).
3. *Empirical Qualitative Research (Planned phase)*
   The forthcoming phase will involve semi-structured interviews with a carefully selected sample of Italian SMEs' sustainability managers, executives, and decision-makers. Interviews will gather empirical insights into SMEs' ESG implementation experiences, perceptions of digital technologies, and practical impacts of adopting ESG digital platforms.

Results

Preliminary analyses highlight several *significant challenges and opportunities:*

Regulatory and Operational Challenges

Italian SMEs typically face financial constraints, limited internal expertise, and inadequate governance structures, complicating their ability to adhere to CSRD's ESG reporting requirements. The complexity and comprehensiveness of required ESG disclosures amplify these constraints, imposing significant burdens on SMEs' limited resources (Capasso & Lattarulo, 2023).

Organizational and Managerial Factors

Organizational factors such as transformational leadership, innovative organizational culture, and sustainable human resource practices significantly influence SMEs' ESG adoption effectiveness. SMEs often lack structured governance and leadership commitment necessary for successful ESG implementation (Jin & Huang, 2023; Pellegrini et al., 2018).

Potential Impacts of the AWorld Platform

The AWorld digital platform is expected to significantly mitigate SMEs' ESG compliance challenges by:

- *Streamlining ESG data collection, reducing time and resource consumption in reporting processes.*
- *Increasing accuracy and reliability of ESG disclosures through automated data verification and analytics informed by AI.*
- *Enhancing stakeholder engagement capabilities, improving transparency, stakeholder trust, and external communication of sustainability efforts.*
- *Facilitating organizational learning processes and capability development through intuitive user interfaces, personalized recommendations, and ongoing stakeholder interactions (Dablander et al., 2025; Spatola & Zifaro, 2024).*

Research limitations. *This research, still in progress, currently relies on literature review and exploratory analysis. Empirical validation through interviews and further case studies is pending, limiting the immediate generalizability of preliminary findings.*

Managerial implications. *The study aims to provide SMEs with actionable recommendations, including:*

- *Guidance for integrating digital ESG platforms into operational workflows and strategic planning.*
- *Recommendations for internal ESG capacity-building through targeted training and employee engagement initiatives.*
- *Practical advice for effectively communicating ESG achievements externally, thus enhancing SMEs' reputational capital and competitive advantage.*

Theoretical Implications (expected)

By applying the TOE framework, findings are expected to enrich theoretical understanding of ESG adoption processes in SMEs. Specifically, this study may contribute empirical evidence on how regulatory pressures (CSRD), organizational constraints (SME-specific limitations), and technological innovations (AI-driven ESG tools) interact to shape SMEs' ESG reporting practices.

Originality of the paper. *This research uniquely explores ESG implementation within Italian SMEs, explicitly linking regulatory analysis (CSRD), digital innovation adoption (AWorld), and organizational factors (leadership, culture). The integration of the TOE framework adds theoretical depth, addressing a clear gap in current ESG literature.*

Conclusion and future directions. *Initial findings indicate that, despite substantial challenges, SMEs can significantly benefit from ESG compliance, particularly when strategically leveraging digital innovations such as the AWorld app. Future empirical research will validate these preliminary insights, providing robust theoretical contributions and actionable managerial recommendations for SMEs.*

Keywords: *ESG; sustainability; CSRD; SMEs; digital platforms; AWorld; compliance; stakeholder engagement; transformational leadership.*

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Unpacking ESG performance and the relation with green innovation: the moderating role of board cultural diversity

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Abstract

European companies, driven by increasingly stringent sustainability regulations, have committed to improving their ESG performance. What was once just a matter of compliance is now evolving into a fully integrated approach, where sustainability is embedded in corporate policies and strategic decision-making. This shift reflects the growing recognition that ESG considerations are not just regulatory requirements but key drivers of long-term value creation, risk management, and competitive advantage in the global market.

However, embedding ESG principles into corporate practices remains complex, requiring firms to embrace innovation, rethink conventional business paradigms, and redesign operational processes to align with sustainability goals. Green innovation has emerged as a critical factor in improving ESG performance by enabling companies to develop sustainable technologies, eco-efficient production processes, and environmentally responsible products. Nevertheless, the effectiveness of green innovation in driving ESG outcomes may depend on various internal governance factors.

This study explores the relationship between green innovation and ESG performance, focusing on the moderating role of board cultural diversity. Understanding how green innovation contributes to environmental, social, and governance outcomes is crucial in an era when sustainability has become a key driver of corporate success. However, the effectiveness of these innovation strategies is not solely determined by technological advancements or regulatory compliance; governance structures, particularly board diversity, play a significant role in shaping corporate sustainability efforts.

Therefore, this research focuses on the governance mechanisms that enhance ESG performance by examining how culturally diverse boards influence the adoption and implementation of green innovation. Board members from different cultural backgrounds bring diverse perspectives, values, and strategic approaches, which can foster more dynamic decision-making and a broader understanding of global sustainability challenges. Their varied experiences may lead to stronger oversight, better risk management, and a more proactive approach to integrating green initiatives into corporate strategy.

Framing of the research. *During the last few years, scientists, practitioners, and the public have shown increased interest in preserving the environment and using resources efficiently, improving human living standards, and promoting long-term economic competitiveness. The term "sustainability", encompassing environmental, social, and economic concerns, was introduced by the World Commission on Environment and Development (WCED, 1987).*

Along with the sustainability term, the organizations started to deploy Environmental, Social and Governance (ESG) plans, which refer to organizational practices aimed at promoting positive effects with the aim of forging a fairer and enduring future. This shift is reflected in the increasing integration of ESG principles into corporate decision-making, transforming sustainability from a compliance requirement into a driver of long-term value creation (Porter and Kramer, 2011). Companies are now expected to generate financial returns and shared value by addressing societal and environmental needs through responsible business practices.

However, embedding ESG principles into corporate strategies is a complex and multifaceted endeavor. It requires firms to rethink conventional business paradigms, invest in green innovation, and implement governance mechanisms that align sustainability goals with long-term corporate success (Dicuonzo et al., 2022).

Based on the stakeholder theory, an enterprise is an institutional arrangement of specialized investment in intelligence and management. The survival and development of an enterprise depend on the quality of its response to the interest requirements of various stakeholders. Companies planning green innovation will be better equipped to fulfill ESG responsibilities and accumulate reputational capital, further promoting corporate operating performance (Fatemi et al., 2018; Velte, 2017). Meeting the expectations of the government, residents, and the media, it is necessary to obtain support

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from financial institutions and reduce the pressure of financing constraints. Solving financing constraints will further promote corporate green innovation, creating a virtuous cycle (Bond et al., 2005; Savignac, 2008; David et al., 2008).

Indeed, it's paramount for the board of directors (from now on, BoDs) to actively oversee ESG issues, integrating sustainability risks into strategic planning and decision-making processes. This key governance body plays a pivotal role in steering corporate responsibility efforts, fostering a positive corporate culture, ensuring alignment with strategic objectives, and endorsing robust corporate governance frameworks (Aguilera et al., 2006; Jo and Harjoto, 2011; Agyei-Mensah, 2023).

Hill and Jones (1992) attribute a fundamental role to BoDs in overseeing an organization's sustainable practices and being accountable to various interest groups. This role has strengthened, especially in recent years, when the imperative of balancing the interests of people, the planet, and profit has firmly entrenched itself in discussions within corporate boardrooms worldwide. In fact, BoDs are increasingly accountable for environmental and social impacts because of their substantial responsibility in provoking them (Elkington 2006; Kakabadse 2007).

Substantial evidence indicates that diverse board attributes can significantly influence corporate social responsibility (Webb, 2004; Dunn and Sainty, 2009; Huang, 2010). For example, Mohy-ud-Din (2024) shows that board diversity in U.S. companies fosters green innovation by driving investments in green technologies and developing eco-designed products. Also, Bazel-Shoham et al. (2024) show that more women on the board positively and significantly influence corporate decision-making on green innovation.

A characteristic that so far has had less attention is the cultural background of directors (Harjoto et al., 2019; Khatib et al., 2021). This characteristic, commonly known as board cultural diversity, encompasses the idea that board members originate from various cultural backgrounds or belong to different cultures, often referred to as cultural diffusion (Luo et al., 2021).

The significant influence of BoDs on ESG activities suggests that directors' features can substantially impact ESG and corporate responsibility outcomes (O'Neill et al., 1989). This is coherent with upper echelons theory (e.g., Hambrick and Mason, 1984; Hambrick, 2007), emphasizing the influence of BoDs' characteristics, values, knowledge, and experience on their decision-making processes. Particularly, since BoDs play a significant role in shaping the formulation of sustainability policies (Yarram and Adapa, 2021), a relevant aspect is represented by the different traits and cultures of directors, as summarized by the concept of board cultural diversity.

For example, Aliani et al. (2024) found that organizations must prioritize fostering diversity within their boards and establishing clear, well-defined structural policies to institute ESG strategies effectively. Additionally, previous studies have shown that a diverse cultural background within the board is related to higher corporate social responsibility practices and improved ESG performance (Harjoto et al., 2015, 2019; Beji et al., 2021; Ouyang et al., 2022; Cheung and Lai, 2023).

Purpose of the paper. *This paper examines the relationship between ESG pillars and green innovation, focusing on how each pillar contributes to sustainable business practices. By analyzing the effects of green innovation on environmental, social, and governance factors, both individually and compositely, the study seeks to determine whether green innovation drives them individually or functions collectively to drive sustainable development. Given the increasing relevance of green innovation strategies in corporate decision-making, understanding their role in fostering ESG performance is essential for businesses aiming to enhance their sustainability efforts. Specifically, the study investigates whether adopting green innovation impacts a company's ESG performance, assessing RQ1: Does the adoption of green innovation in a company impact its ESG performance?*

Grounded in stakeholder theory, we propose the following hypothesis:

H1: Firms with greater adoption of green innovation positively impact ESG performance, both at the individual and composite levels.

Furthermore, this research explores the moderating role of board cultural diversity in the ESG-green innovation relationship. Prior research suggests that culturally diverse boards improve social and environmental performance (Martinez-Ferrero et al., 2021). Also, a diverse board brings varied perspectives, experiences, and decision-making approaches, which can enhance the incorporation of stakeholder concerns into business strategies. Cultural diversity fosters broader discussions, eases knowledge sharing, and introduces fresh insights that drive sustainable innovation. To assess this dynamic, the study addresses RQ2: Does board cultural diversity moderate the relationship between adopting green innovation and a company's ESG performance?

Grounded in upper echelons theory and existing research on the positive influence of board cultural diversity on sustainability practices and corporate performance, we propose the following hypothesis:

H2: Firms with higher board cultural diversity are more likely to achieve positive ESG performance by adopting green innovation.

Methodology. *The dataset used in this study consists of organizations listed in the Euro Stoxx 600 index, a key financial benchmark for the Eurozone, developed by STOXX, a leading index provider under the Deutsche Börse Group. This index encompasses a diverse range of major European companies across multiple industries, making it a widely recognized representation of the region's economic landscape (Paolone et al., 2024).*

Furthermore, our study examines the period from 2014 to 2023. This timeframe is particularly relevant as, from 2014 onwards, regulatory developments and compliance requirements in the European context led companies to place greater emphasis on sustainability and its impact on all the dimensions of environment, society, and governance. To answer our

research questions, we employ the individual and the composite scores of ESG pillars as dependent variables obtained from the LSEG Workspace Refinitiv ESG database, which is widely recognized as a prominent and reputable source of data for its transparent and objective assessment of ESG (LSEG website). These pillars are frequently used as a proxy for corporate sustainability performance in academic literature (e.g., Uyar et al., 2022; Paolone et al., 2024).

In line with Fabrizi et al. (2018), the independent variable, green innovation, comes from data extracted from the OECD PATSTAT database. These patents are identified using search strategies for environment-related technologies (ENV-TECH) developed by OECD staff. This method primarily relies on the International Patent Classification (IPC) system established by the World Intellectual Property Organization. The IPC system categorizes inventions into more than 70,000 technological groups and subgroups, enabling the identification of technologies related to environmental management (such as human and ecosystem health), water-related adaptation, and climate change mitigation.

Our moderator (board cultural diversity) is defined as the percentage of board members with a cultural background different from the location of the corporate headquarters, and it is obtained from the LSEG Workspace Refinitiv ESG database.

We use a fixed-effect panel model. This model combines cross-sectional and time series data. It is well-suited for this regression analysis due to its ability to control time simultaneously, individual, and cross-sectional variations. Cross-sectional fixed effects and time-fixed effects further bolster the robustness of the analysis by accounting for differences across firms and years (Greene, 2005).

Moreover, we control specific firm characteristics like size, which is measured by the number of total assets and firm age, and other financial variables like debt on equity, profitability (measured as return on asset), and quick ratio.

Results. *With this investigation, we aim to understand how ESG can be incorporated into business strategies, as a neglected research area suggested by other studies (Makridou et al., 2023) and going beyond only financial value (Wong et al.,2020). Our preliminary results show that green innovation, measured by the adoption of green patents (Fabrizi et al., 2018) impacts a firm's ESG performance. This is consistent with the idea that companies that invest in sustainable technologies and eco-efficient production processes are better positioned to meet environmental and social expectations while improving governance structures. In addition, the cultural diversity of boards plays a moderating role in this relationship, reinforcing the positive effects of green innovation on ESG outcomes. Culturally diverse boards may contribute to more comprehensive sustainability strategies by integrating a broader range of perspectives, improving risk assessment, and fostering long-term value creation.*

Research limitations. *While this study provides insights, it is subject to certain limitations. First, our sample is restricted to European companies, which may limit the generalizability of our findings to other geographical contexts with different regulatory frameworks and corporate governance structures. Future research could extend the analysis to a broader set of countries to enhance external validity.*

Second, our analysis focuses on a specific time period, which, while justified, may not fully capture long-term trends or the evolving dynamics of corporate sustainability practices. Expanding the temporal scope in future research could offer a more comprehensive perspective on these developments. Additionally, we acknowledge that this period includes the disruptive impact of the COVID-19 pandemic. Future studies could account for this impact to better isolate its effects on the observed relationships.

Third, our measure of green innovation relies on the OECD database patents as the primary indicator of firms' environmental innovation efforts. While patents are widely used as a proxy for innovation, they may not capture all forms of sustainability-driven technological advancements, such as process improvements or non-patented innovations. Future studies could complement this approach by incorporating alternative measures of corporate sustainability innovation. Although patents have some drawbacks as indicators of technological activity (not all inventions are patented, the incentives to patent differ according to the sector and market, protection systems vary across countries, etc.), their use as a measure of output of the inventive process has become standard in the literature (Griliches, 1990; Hall et al., 1986)

Finally, our analysis of board diversity focuses only on cultural aspects, potentially overlooking other dimensions that may influence sustainability-related decision-making. Moreover, we recognize that the variable from LSEG Refinitiv may not fully consider all possible aspects of cultural diversity. Future research could adopt a more holistic approach by integrating additional board attributes that overcome this issue.

Managerial implications. *From a managerial perspective, our preliminary findings highlight key implications. Corporate leaders should embrace board cultural diversity as a governance tool to enhance ESG performance, prioritizing diverse directors for broader sustainability perspectives. Also, green innovation should be integrated into a long-term strategy, not just compliance. Aligning governance with ESG objectives fosters sustainability, financial resilience, and stakeholder trust. Policymakers can leverage these insights to promote diversity-driven governance supporting green innovation.*

This study advances our understanding of governance mechanisms for corporate sustainability. It shows how board diversity and innovation drive responsible and competitive business practices and offers valuable insights for policymakers and leaders aiming to strengthen ESG performance.

Originality of the paper. *The preliminary findings of this study and the unique combination of variables-green innovation, the individual and composite ESG pillars, and the moderating role of board cultural diversity-position it as an original contribution to the literature. Specifically, this study builds upon and extends the work of Bazel-Shoham et al. (2024) by introducing green innovation as a key driver of ESG performance and assessing how board cultural diversity moderates this relationship. Unlike previous studies that often treat ESG as a single aggregated measure, our research*

takes a more granular approach by analysing each ESG pillar (Environmental, Social, and Governance) separately. This allows for a more nuanced understanding of how green innovation influences different dimensions of sustainability and how governance structures shape these dynamics.

Moreover, we employ a characteristic of the board that has had less attention and is the cultural background of directors (Harjoto et al., 2019; Khatib et al., 2021). By incorporating board cultural diversity as a moderating factor, this study sheds light on how diverse cultural perspectives within corporate boards can shape strategic decision-making, risk assessment, and sustainability orientation. Given that cultural diversity influences cognitive perspectives, problem-solving approaches, and strategic priorities, our research offers fresh insights into facilitating or constraining green innovation's impact on ESG performance.

Keywords: *ESG performance; sustainability; green innovation; governance; board cultural diversity.*

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Understanding the Interplay Between ESG Performance and ESG Controversies: A Quadrant-Based Framework

EMILIA FILIPPI[1] ALICE ALOSI[2]

Abstract

This study examines the complex relationship between Environmental, Social, and Governance (ESG) performance and ESG controversies, focusing on U.S.-based firms. It explores how companies can enhance their ESG performance while managing the reputational risks associated with ESG-related controversies. The research utilizes data from LSEG Data & Analytics to analyse the role of corporate governance (i.e., larger boards, presence of independent directors, women directors, and a CSR committee), firm size, age, profitability, and industry in shaping a company's ability to effectively navigate ESG issues. Findings shows that the characteristics of company's corporate governance, company's size, age, and profitability improve the ability to achieve high ESG performance and effectively manage ESG controversies. Instead, operating in a controversial industry does not exert an effect. The study contributes to both managerial practices and theoretical understanding of corporate sustainability, suggesting avenues for future research to further explore the single dimensions of ESG and the broader global context.

Framing of the research. *In academic literature, Corporate Social Responsibility (CSR) is often viewed as a broad framework that includes various initiatives aimed at meeting the different expectations of stakeholders, which range from environmental protection to social welfare and shareholder returns (Erhemjamts and Huang, 2019). Proactive actions aimed at environmental protection and improving society can enhance a company's reputation, thus strengthening its position among a broad range of stakeholders, including consumers, investors, and the broader community (Weston and Nnadi, 2023; Wu et al., 2023).*

Recently, the concept of Environmental, Social, and Governance (ESG) has emerged as a more concise way to represent the key aspects of CSR (Tsang et al., 2022). ESG factors have increasingly become a key focus for investors, regulators, and stakeholders in evaluating the long-term sustainability and ethical practices of companies (Duque-Grisales and Aguilera-Caracuel, 2021; Weston and Nnadi, 2023). These factors cover a wide range of issues, from environmental sustainability and reducing carbon footprints to social responsibility and ethical governance (Tsang et al., 2022). Integrating ESG practices into business strategies is often seen as a way to gain a sustainable competitive edge, enhance a company's reputation with stakeholders, and create long-term value (Wu et al., 2023; Wang et al., 2024). ESG practices encompass both tangible actions and public communication, such as ESG performance and disclosure (Wang et al., 2024). ESG performance, as a strong commitment to an ESG strategy, is positively linked to firm value (Tampakoudis and Anagnostopoulou, 2020). For instance, actions like improving information quality and fostering stakeholder engagement, while costly in the short term, can prove beneficial in the long run by reducing corporate controversies (Wang and Sarkis, 2017).

The increasing focus on ESG has led to increased ESG-related controversies (Nirino et al., 2021; Wu et al., 2023). ESG-related controversies span a broad spectrum, from environmental disasters like toxic waste spills to irresponsible social practices, such as human rights violations, and corporate governance misconduct, including accounting frauds. ESG controversies can severely damage a firm's reputation and financial performance. Financially, ESG controversies often lead to lower firm value (Wu et al., 2023), higher stock price volatility (Ilhan et al., 2023), increased costs of capital (Rau and Yu, 2023), and reduced market share (Islam et al., 2021). Non-financial impacts include a loss of consumer trust, brand devaluation (Klein and Dawar, 2004), and heightened regulatory scrutiny (Gillan et al., 2021). Additionally, such controversies can harm stakeholder relationships and hinder a firm's ability to attract and retain talent (Singh and Misra, 2021). Legal consequences and activism from stakeholders can also emerge, complicating a company's operational environment (Al-Hiyari, 2024). The visibility of a company amplifies the repercussions of ESG-related controversies, making it more vulnerable to reputational damage and loss of stakeholder trust (Aouadi and Marsat 2018). In conclusion, addressing ESG controversies is critical for firms to protect both their financial standing and long-term strategic success.

These controversies tarnish a firm's reputation and raise questions about the efficacy of ESG performance in capturing the true ethical and sustainable nature of business operations (Chatterji et al., 2016). Moreover, such

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controversies can trigger legal repercussions and stakeholder activism, further complicating the firm's operational landscape (Freudenreich et al., 2020). The paradoxical relationship between ESG performance and ESG controversies underscores the complexity of effectively implementing ESG initiatives (Busch et al., 2016). For instance, according to Nirino et al. (2021), ESG controversies reduce firms' financial and non-financial performance while ESG performance does not have a positive moderating effect, despite being important for satisfying stakeholders' needs. Similarly, Keidann Soschinski et al. (2024) found that ESG practices are essential to meet stakeholders' needs but are not enough to mitigate the negative impact of ESG controversies. Instead, higher ESG performance and lower ESG controversies scores reduce the cost of debt capital (Hampl and Linnertová, 2024).

This complexity calls for a more nuanced understanding of how ESG issues are managed, reported, and integrated with a firm's broader strategic objectives (Chou et al., 2023).

Purpose of the paper. *Given that ESG performance enhances firm value and overall performance, while ESG controversies diminish them (Keidann Soschinski et al., 2024), we believe that companies should strive to improve their ESG performance while simultaneously reducing and managing ESG controversies. Hampl and Linnertová (2024, p. 1742) underline how "the most controversial companies with the lowest ESG controversies score can benefit an increase in ESG performance […] as ESG performance alleviates the consequences of their bad reputation". Specifically, companies should enhance ESG practices and avoid ESG controversies to benefit reduced cost of debt capital (Hampl and Linnertová, 2024). The primary objective of this study is, therefore, to understand how companies vary in their ability to enhance ESG performance and manage ESG controversies.*

The existing literature discusses how factors such as corporate governance, firm size, firm age, economic and financial conditions, and the industry in which a company operates influence its ability to achieve high ESG performance and manage ESG controversies effectively. Specifically, good governance plays a crucial role in the ESG framework, acting as a safeguard against ethical lapses that could result in ESG controversies. For instance, a diverse board is more likely to consider a wider range of stakeholder interests, thereby reducing the likelihood of ESG-related issues (Freeman et al., 2018). Firms with diverse board characteristics, such as gender diversity, independent board members, and board size, are better positioned to make quick and informed decisions, allowing them to take corrective actions swiftly (Bagh et al., 2023; Dong et al., 2023). For example, an independent board brings specialised knowledge and networks relevant to ESG issues and is more committed to addressing stakeholders' expectations, alleviating conflicts of interest among stakeholders (Endrikat et al., 2021; Abdullah et al., 2024). At the same time, an independent board is more willing to replace management or revise strategies that led to the ESG controversy, signaling to the market and stakeholders that corrective steps are being taken (Zattoni et al., 2023). The presence of women directors enhances the board of directors' awareness of ESG issues and its ability to address stakeholders' needs (Shahbaz et al., 2020; Cabral & Sasidharan, 2021). This increased awareness ensures that ESG issues are better integrated into firm strategies, while mitigating the risk of misconducts (Galbreath, 2011; Arayakarnkul et al., 2022). Women directors are more sensitive to the adverse consequences of ESG controversies (Issa and Hanaysha, 2023). Finally, the CSR committee ensures that the ESG goals outlined in the corporate strategy are met and that commitments to stakeholders are fulfilled (García-Sánchez et al., 2021; Moreno-Ureba et al., 2022). Firms with a CSR committee show fewer ESG controversies (Elmaghrabi, 2021). Previous literature also shows that larger and older firms are more likely to address ESG issues and present greater capacity for stakeholder engagement due to increased stakeholder pressure (Biswas et al., 2018; Orazalin, 2020). Firms with higher profitability present higher financial ability to invest in ESG activities (Ananzeh et al., 2022; Zhang et al., 2018). Finally, previous research indicates that companies in controversial industries may be less inclined to adopt CSR as a genuine long-term strategy and are more likely to encounter legal ESG challenges compared to those in non-controversial sectors (Eriandani and Wijaya, 2021).

Considering the discussions in the existing literature, the objective of this study is to understand how contextual factors (e.g., corporate governance, firm size, firm age, economic and financial conditions, and industry) influence a company's ability to achieve high ESG performance and effectively manage ESG controversies.

Methodology.

Data*. This study uses data obtained from LSEG Data & Analytics, previously known as Refinitiv Eikon Datastream, a prominent database focused on social, environmental, and corporate governance. It is widely utilized by professional investors and academic researchers (Giannarakis et al., 2023). LSEG Data & Analytics provides information on over 15,500 public and private companies worldwide, covering more than 90% of global market capitalization, with data records dating back to 2002 (LSEG Data & Analytics, 2023). The database is recognized as the largest and comparable resource for CSR-related data (Uyar et al., 2020). The CSR data are sourced from publicly available materials such as CSR reports, annual reports, company websites, stock exchange filings, and media outlets (LSEG Data & Analytics, 2023), and are widely regarded as transparent, accurate, and comparable (Giannarakis et al., 2023).*

Our dataset is unbalanced, containing data from 2,874 U.S. firms, with a total of 15,992 firm-year observations covering the period from 2014 to 2023. We focused on the United States since the Refinitiv database includes listed firms from different countries and the coverage of ESG engagement and controversy data vary across countries. Therefore, following Kotzian (2024), we decided to select U.S. firms to ensure a consistent and large dataset[3]*.*

[3] On the contrary, the analysis of the sample of Italian firms presents some limitations, mainly due to the small sample size over the considered time period; therefore, the authors decided not to focus the analysis on this country.

Method. *To understand how contextual factors (e.g., corporate governance, firm size, firm age, economic and financial conditions, and industry) influence a company's ability to achieve high ESG performance and effectively manage ESG controversies, we performed an ordered logistic regression, a type of logistic regression where the dependent variable is categorical and ordered into more than two categories (Fullerton, 2009).*

Variables. *In this analysis, the dependent variable "ESG profile" is a categorical variable that assesses both ESG performance and ESG controversy levels. It classifies companies into four categories based on whether their ESG performance level at time t and ESG controversy level at time t-1 are high or low. Specifically:*

- *ESG Leader, Controversy-Free. These companies stand out for their strong ESG performance, coupled with effective management of reputational risks. They implement advanced sustainability, social responsibility, and governance strategies while minimizing controversies. This profile is typical of companies considered ESG benchmarks, with a well-established and widely recognized positive impact.*
- *ESG Leader, Reputationally Challenged. This category includes companies that achieve high ESG performance levels but frequently face controversies or criticism. This may stem from the adoption of innovative yet contentious ESG strategies, operations in high-impact sectors, or challenges in balancing the interests of diverse stakeholders. These companies may be seen as both pioneers of the ESG transition and entities facing reputational risks.*
- *Controversy-Free, Low ESG Performer. Companies in this category maintain a cautious ESG profile, avoiding scandals and controversies but without implementing ambitious sustainability, governance, or social responsibility strategies. While they are perceived as reputationally stable, their contribution to ESG innovation and progress remains limited.*
- *Reputationally Challenged, Low ESG Performer. Companies in this category face a dual challenge: low ESG performance and frequent exposure to controversies related to environmental, social, or governance issues. This profile suggests inadequate ESG risk management, potentially leading to negative impacts on reputation, investor confidence, and the company's long-term sustainability.*

In this analysis, the dependent variables include "Board size", "Independent directors", "Women directors", "CSR committee", "Firm size", "Firm age", "ROA", "Leverage", "Controversial industry".

Tab. 1 provides a description of dependent and independent variables.

Tab. 1: Description of dependent and independent variables

Variable	Definition	Source
Dependent variable		
ESG profile	Categorical variable that assesses both ESG performance and ESG controversy levels. It classifies companies into four categories based on whether their ESG performance and controversy levels are high or low. Specifically: 1) ESG Leader, Controversy-Free; 2) ESG Leader, Reputationally Challenged; 3) Controversy-Free, Low ESG Performer; 4) Reputationally Challenged, Low ESG Performer	Our elaboration
Independent variables		
Board size	Logarithm of the total number of directors	Refinitiv
Independent directors	Percentage of independent directors	Refinitiv
Women directors	Percentage of women directors	Refinitiv
CSR committee	Dummy variable equal to 1 if the firm has a CSR committee, and 0 otherwise	
Firm size	Logarithm of total assets	Refinitiv
Firm age	Logarithm of years since firm foundation	Refinitiv
ROA	Return on assets, defined as the ratio of net income on total assets	Refinitiv
Leverage	Ratio of debt to total assets	Refinitiv
Controversial industry	Dummy variable equal to 1 if the firm belongs to a controversial industry, and 0 otherwise	Our elaboration

Results.

Descriptive statistics. *The descriptive statistics (Tab. 2) show that the category "Controversy-Free, Low ESG Performer" is the largest one (66.239% of companies are classified in this category), followed by the category "ESG Leader, Controversy-Free" (27.414%). Few companies are classified as "Reputationally Challenged, Low ESG Performer" (2.057%) or "ESG Leader, Controversy-Free" (27.414%).*

The correlation matrix (Tab. 3) shows acceptable correlation indexes between the variables (Greene, 2003).

Tab. 2: Descriptive statistics

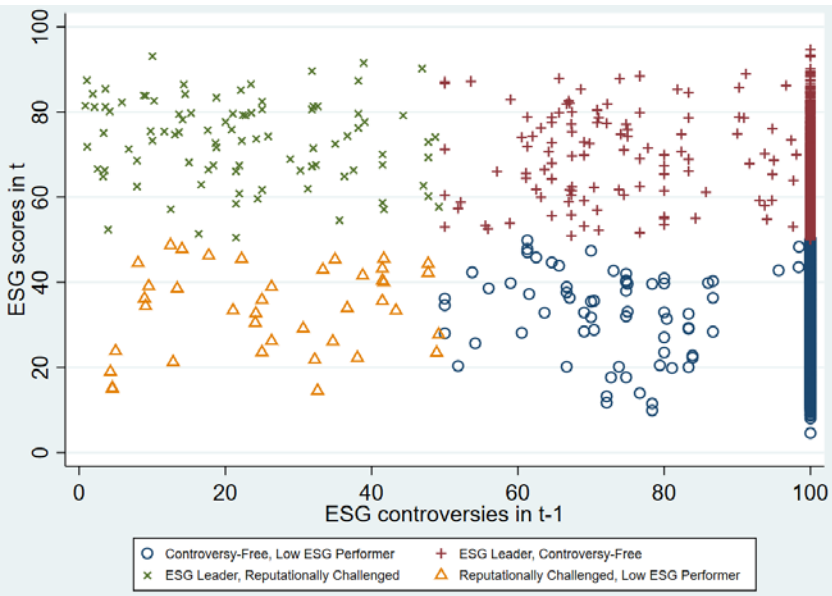
Variable	Mean	Stand. dev.	Min	Max
Reputationally Challenged, Low ESG Performer	2.057%	0.142	0	1
Controversy-Free, Low ESG Performer	66.239%	0.473	0	1
ESG Leader, Reputationally Challenged	4.290%	0.203	0	1
ESG Leader, Controversy-Free	27.414%	0.446	0	1
Board size	2.211	0.270	0	4.779
Independent directors	0.780	0.120	0	1
Women directors	0.209	0.117	0	1
CSR committee	0.367	0.482	0	1
Firm size	21.810	1.905	13.916	29.023
Firm age	1.413	0.326	0.301	2.344
ROA	-0.319%	0.163	-1.047%	31.701%
Leverage	0.273	0.231	0	3.239
Controversial industry	0.171	0.376	0	1

Tab. 3: Correlation table

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Reputationally Challenged, Low ESG Performer	1.000												
(2) Controversy-Free, Low ESG Performer	-0.203	1.000											
(3) ESG Leader, Reputationally Challenged	-0.031	-0.297	1.000										
(4) ESG Leader, Controversy-Free	-0.089	-0.861	-0.130	1.000									
(5) Board size	0.025	-0.319	0.177	0.250	1.000								
(6) Independent directors	-0.002	-0.280	0.084	0.259	0.198	1.000							
(7) Women directors	-0.012	-0.290	0.102	0.264	0.138	0.236	1.000						
(8) CSR committee	-0.016	-0.574	0.231	0.509	0.279	0.212	0.265	1.000					
(9) Firm size	0.041	-0.485	0.321	0.355	0.583	0.197	0.172	0.414	1.000				
(10) Firm age	-0.001	-0.224	0.084	0.199	0.233	0.166	0.089	0.183	0.251	1.000			
(11) ROA	0.005	-0.209	0.073	0.186	0.201	0.057	0.041	0.184	0.403	0.254	1.000		
(12) Leverage	0.015	-0.094	0.035	0.079	-0.003	-0.020	0.013	0.106	0.165	-0.043	0.025	1.000	
(13) Controversial industry	0.015	-0.071	0.020	0.062	0.001	0.039	-0.024	0.148	0.017	0.060	-0.054	0.086	1.000

A scatterplot showing the distribution of ESG profiles (i.e., the distribution of companies based on whether their ESG performance level in 2022 and ESG controversy level in 2021) is presented in Fig. 1. In 2022, companies appear to be more evenly distributed across the various ESG profile categories compared to the distribution observed over the entire analysis period (2014-2023; see Tab. 2). This suggests a shift towards a more balanced ESG landscape, potentially driven by increased investor scrutiny or a broader corporate commitment to sustainability principles.

Fig. 1: Scatterplot showing the distribution of companies based on ESG profiles (year: 2022)



As shown in Tab. 4, the characteristics of company's corporate governance (i.e., larger boards, presence of independent directors, women directors, and a CSR committee) play a positive and significant effect in improving a company's ability to achieve high ESG performance and effectively manage ESG controversies. This result is in line with previous literature according to which firms with diverse board characteristics (e.g., gender diversity, independent board members, and board size) are better positioned to make informed EGS decisions (Bagh et al., 2023; Dong et al., 2023). Specifically, independent directors bring specialised knowledge relevant to ESG issues and are more willing to replace management or revise strategies that led to the ESG controversy (Endrikat et al., 2021; Zattoni et al., 2023; Abdullah et al., 2024). Women directors enhance awareness of ESG issues and assure that ESG issues are better integrated into firm strategies, mitigating the risk of misconducts (Arayakarnkul et al., 2022). Finally, the CSR committee ensures that the ESG goals are met and play a key role in reducing ESG controversies (Elmaghrabi, 2021; Moreno-Ureba et al., 2022).

Firm size, firm age, and firm profitability positively affect the ability to achieve high ESG performance and effectively manage ESG controversies, in line with previous literature according to which larger and older firms are more likely to address ESG issues (Biswas et al., 2018; Orazalin, 2020), while higher profitable firms present higher financial ability to invest in ESG activities (Ananzeh et al., 2022; Zhang et al., 2018).

Finally, operating in a controversial industry does not influence a company's ability to achieve high ESG performance and effectively manage ESG controversies. This result contrasts with previous literature according to which operating in a controversial industry affects ESG strategies and behaviors (Eriandani and Wijaya, 2021).

Tab. 4: Regression results

Variables	Model
Board size	0.212** (0.0861)
Independent directors	2.592*** (0.173)
Women directors	2.578*** (0.187)
CSR committee	1.905*** (0.0459)
Firm size	0.227*** (0.0142)
Firm age	0.380*** (0.0603)
ROA	1.027*** (0.146)
Leverage	0.225** (0.0895)
Controversial industry	-0.0679 (0.0522)
Year dummies	Yes
Cut1	5.149*** (0.302)
Cut2	11.01*** (0.315)
Cut3	11.33*** (0.315)
LR chi2	6371.91
Prob > chi2	0.0000
Pseudo R2	0.2364
Observations	15,992
Number of firms	2,874

*Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Research limitations. *The study primarily focuses on U.S.-based firms, which may limit the generalizability of the findings to companies in other regions with different regulatory environments, cultural contexts, and stakeholder expectations. Future research could expand the scope to include firms from diverse geographical areas to provide a more global perspective.*

Moreover, the study mainly addresses ESG performance and controversies, potentially overlooking specific dimensions of ESG, such as environmental, social, and governance factors (e.g., resource use, emissions, workforce conditions, and community impact). The lack of detailed data on ESG controversies prevented an in-depth exploration of these individual dimensions. Future research could replicate the analysis focusing on the single dimensions of ESG.

Additionally, the study relies on data from publicly traded firms, which may not reflect the practices of private companies or startups. These entities may approach ESG performance differently due to variations in transparency, resource availability, and external pressures. Furthermore, the visibility of public companies may amplify the repercussions of ESG-related controversies. Future research could understand if and how publicly traded firms and non-traded firms differently manage the balance between ESG performance and ESG controversies.

Managerial implications. *The findings of this study offer valuable insights for firms seeking to enhance their company's ESG performance while mitigating the risks of ESG controversies. The results emphasize the importance of implementing robust ESG strategies that align with stakeholder expectations, alongside effective mechanisms for managing reputational risks. Specifically, the study suggests that companies can benefit from integrating diverse board characteristics (e.g., larger boards, presence of independent directors, women directors, and a CSR committee) and strong corporate governance practices, which enhance decision-making and help prevent ESG controversies. Firms should focus on balancing ambitious sustainability goals with transparent communication and stakeholder engagement to avoid controversies that could undermine long-term value.*

Additionally, our results show that operating in a controversial industry does not influence a company's ability to achieve high ESG performance and effectively manage ESG controversies. This suggests that achieving strong ESG performance by minimizing ESG controversies is a desirable approach, regardless of the industry in which a company

operates or the external pressures it faces. To this end, companies should proactively integrate sustainable practices, enhance transparency, and adopt robust governance frameworks to mitigate risks and strengthen stakeholder trust.

Originality of the paper. *This paper contributes to the theoretical understanding of ESG by shedding light on the management between high ESG performance and the occurrence of ESG-related controversies. It challenges the conventional view that improving ESG performance inherently reduces reputational risks, illustrating instead the complex interplay between ESG initiatives and the potential for negative public perception. The study introduces a novel framework for categorizing firms based on their ESG profiles, which provides a deeper understanding of how companies can balance performance and controversy. Furthermore, it extends existing literature by examining the role of contextual factors, such as corporate governance (i.e., larger boards, presence of independent directors, women directors, and a CSR committee) and firm characteristics (i.e., operating in a controversial industry), in shaping the ability of firms to manage ESG challenges. These insights offer a more nuanced perspective on ESG management and contribute to the ongoing development of theories related to corporate social responsibility and sustainability.*

Key words: *ESG performance; ESG controversies; Quadrant-based framework; Board characteristics; Controversial industry; Quantitative analysis.*

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Corporate purpose and sustainability: Do SDGs references in Purpose statements influence ESG performance?

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Abstract

Sustainability has become a global priority, with the United Nations' Sustainable Development Goals (SDGs) providing a strategic framework to address societal grand challenges. The UN Agenda 2030 represents a "call to action" for companies that are recognized as pivotal agents for societal transformation and the achievement of sustainable development. Companies are called to embed sustainability values within their core strategies and daily operations and to disseminate a culture of sustainability among all their stakeholders. Consequently, many companies incorporate the SDGs into their purpose statements, indicating alignment with global sustainability initiatives. Nevertheless, there is a paucity of evidence to suggest that these references result in quantifiable enhancements in corporate sustainability performance. While corporate purpose is widely acknowledged for its guidance and communicative roles, empirical research linking SDG references to tangible environmental, social, and governance (ESG) performance is scarce. This study addresses this gap by empirically examining the relationship between SDG references in corporate purpose statements and their ESG performance. The findings reveal a significant and positive relationship between the presence of references to global goals in corporate manifestos and companies' higher ESG metrics, suggesting that their integration is not just a rhetorical action but a pragmatic strategy that positively affects organizational performance related to sustainability outcomes. In addition, a controversial result was found as companies in countries with higher SDG ratings reported lower ESG scores. This study advances the field of corporate sustainability and strategic management, providing practical recommendations for managers and policymakers to align business purpose with organizational performance in the context of sustainable development goals.

Framing of the research. *Since the last decade, corporate purpose has re-emerged as a strategic framework to help organizations address sustainability challenges while aligning social responsibility with financial and economic goals (Sasaki et al., 2023; Sasaki et al., 2024). While there is no agreed-upon definition, modern management scholars have generally defined corporate purpose as a firm's ultimate goal beyond profit maximization (Henderson et al., 2015; Mayer, 2021; Jimenez et al., 2021; Gartenberg, 2023). Purpose has been described as the heart of an organization, the reason for its existence, which is rooted in its authenticity and core values (George et al.,2021). It reflects the organization's long-term vision of creating value for all its stakeholders - including employees, customers, communities, and the environment - rather than narrowly focusing on shareholders' interests (Freeman, 1984., Freeman et al., 2004). The organizational purpose is the driving force behind shared value creation (Porter and Kramer 2011) which means that firms solve societal issues - like climate change and equality- through new business strategies that create both financial and social results. It plays a decisive role in shaping corporate strategy and decision-making processes, helping organizations to harmonize their operations with overall social and environmental goals. (Kaplan S.,2023). Beyond strategic alignment, corporate purpose significantly influences employee behavior by fostering a sense of responsibility and commitment to the organization's overarching mission. A well-structured corporate purpose acts as a performance driver, motivating employees to exceed expectations and contribute to long-term success (van Tuin et al., 2020). Furthermore, a clear and explicit purpose can help attract, select, and retain highly motivated employees (Delaney & Royal, 2017), strengthen stakeholder relationships, and enhance trust and long-term value creation (Henisz, 2023). As a consequence of the numerous advantages that the articulation of corporate purpose offers, it can be argued that it is more than a theoretical concept: it marks the start of the events and has extensive practical implications for the wider society and its members.*

In this context, Hollensbe et al. (2014) stated that purpose acts as an ethical and moral compass that directs strategic decisions and aligns the firm's operations with its social mission. Due to this intimate moral connotation, Gartenberg (2022) argued that corporate purpose is often explicitly prosocial and intrinsically related to business sustainability, asserting that "Purpose requires sustainability and vice-versa". The relationship between corporate purpose and

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business sustainability may be mutually reinforcing, with consequences for leadership roles, behavior influence, and goal determination (Florez-Jimenez et al., 2024; Florez-Jimenez et al., 2025; Pardo-Jaramillo et al., 2025). The 2030 Agenda and the achievement of the SDGs have further strengthened the link between these two elements, making a genuine alignment between stated goals and operational strategies essential.

To effectively implement the corporate purpose in business strategy, it must be clearly articulated, explicitly communicated to all stakeholders (Gartenberg et al., 2019), and, most importantly, translated into tangible actions (Lleo et al., 2021). To encourage the adoption of responsible behaviors, it has to act as a guideline that promotes the diffusion of a culture of sustainability at every level (Jimenez et al., 2021), ensuring environmental and social commitments become part of daily operations rather than symbolic expressions. Corporate Purpose and the SDGs are closely connected, with the former defining values and direction and the latter providing measurable targets to evaluate progress in sustainable development. Thus, integrating the SDGs within the corporate purpose ensures that the company is seen as a force for good by reimagining its role in the future of sustainable workplaces and societies (Jimenez et al., 2021). While some firms are making meaningful internal changes to address the achievement of Sustainable Development Goals, others seem to exploit their commercial potential to enhance public perception (Nicolò et al., 2022). This suggests instances of sustainability-washing, where companies use sustainability narratives as a public relations tool rather than a genuine commitment to change (Mhlanga et al., 2018). As stakeholders demand greater transparency and authenticity, discrepancies between corporate rhetoric and real sustainable commitment can negatively affect reputation, investments, sales, and the working environment.

The possibility that companies integrate sustainability issues into their corporate purpose to improve their reputation and competitive advantage, has raised debates in the literature regarding the authenticity of their statements. Several scholars have explored the use in sustainability disclosure (Macellari et al., 2021, Saizarbitoria et al., 2022, Arena et al.,2023) concluding that some companies use communication tools - as mission and vision statements - only to fulfill stakeholders' expectations and not truly to implement a substantial change in corporate strategies. For instance, Van der Waal and Thijssens (2020) qualitatively analyzed the disclosure practices of the 30 organizations identified as the most comprehensive SDG reporters. Their findings revealed that these groups engaged superficially with a generic description of the goals, no concrete activities were performed, and no measurement or operationalization of the SDGs was achieved. Similarly, Macellari et al. (2021) conducted a content analysis of a sample of sustainability reports published by 28 organizations included in the UN Global Compact LEAD. These organizations are widely considered leaders in SDG issues and reporting practices; however, a discrepancy between information reported and information from external sources was found. Some other authors emphasize the employment of impression management techniques suggesting the instrumentalization of SDGs as a public relations tool. (Mhlanga et al., 2018).

Purpose of the paper. *The extent to which integrating the Sustainable Development Goals (SDGs) into corporate purpose statements represents a genuine commitment to sustainability rather than a rhetorical strategy for enhancing public image remains an open question. While some companies embed sustainability into their core strategies, others adopt only superficial measures, making it difficult to assess the true impact of SDG integration on corporate sustainability performance. Despite the increasing prevalence of SDG discourse for corporate purposes, existing research remains largely conceptual or illustrative (Mayer, 2023). While some studies acknowledge the divergence between sustainability rhetoric and actual performance, the literature lacks systematic, large-scale empirical analyses assessing whether SDG commitments translate into measurable ESG outcomes. Most prior research has focused on corporate sustainability narratives, disclosure practices, or motivations for SDG adoption, but few studies have rigorously examined whether these commitments yield tangible improvements in corporate sustainability performance. This gap is particularly critical given the rising pressure on corporations to demonstrate accountability and social impact, as well as the growing skepticism about the authenticity of corporate sustainability claims.*

To address this gap, this study examines the relationship between SDG references in corporate purpose statements and measurable sustainability performance. Specifically, it seeks to answer the following research question:

RQ: How does incorporating the Sustainable Development Goals (SDGs) into corporate purpose statements influence corporate sustainability performance?

Methodology. *To address our research question, a quantitative analysis was employed. Specifically, a weighted linear regression (WLS) on a comprehensive sample of 340 European manufacturing companies was applied using R statistics software. The manufacturing sector was chosen due to its extensive engagement in industrial operations. This industry is essential to sustainable development since it supports societal advancement, creates jobs, and boosts economic growth. Furthermore, its significant energy, water, and material consumption makes it extremely pertinent to environmental issues (Ahmad et al., 2023). To identify corporate purpose, the mission statements of the firms were analyzed, as these are widely recognized in academic literature as formalized expressions of an organization's purpose. Since mission statements are "explicit expressions of an organization's overarching purpose, goals, and core values" (Bartkus et al., 2006), they were considered a suitable proxy for evaluating corporate purpose in the context of this study (Aljebrini et al., 2025)*

To ensure a structured approach to assessing the relationship between references to the SDGs in corporate mission statements and ESG performance, in the regression model, the chosen variables were classified as follows:

***1) Independent Variable**: A quantitative content analysis was employed to assess the presence of SDGs references in companies' manifestos. Quantitative content analysis is a research method that involves the systematic categorization and recording of features within a text, to facilitate subsequent analysis. This method provides numerical descriptors of a single text or, more commonly, a corpus of texts (Coe and Scasso,2017), and it's frequently utilized in the context of analyzing mission statements (Kemp and Dwyer, 2003; Bartkus et al., 2004; 2006; Dermol, 2012). Firms' purpose statements were identified from their official websites exploring the sections: "Mission," "About us," "Our History," and "Our Philosophy". When unavailable, the information were retrieved from verified social media profiles (e.g., LinkedIn). To detect SDGs citations, it was used a collection of about 847 keywords created by the Sustainable Development Solutions Network (SDSN). This list is based on authoritative and diverse sources, including United Nations documents, targeted Google searches, and direct personal communication (SDSN Australia, New Zealand and Pacific, 2017). The employment of NVivo Software facilitated the organization, coding, and analysis of the textual data. In this context, to assess the presence or the absence of SDG goals in the corporate purpose statement, we used binary values. Specifically, the value "1" was assigned if the reference to at least one SDGs was present, while the value "0" was assigned if such SDGs were absent.*

***2) Dependent Variable:** To measure companies' commitment to sustainability the ESG (Environmental, Social, and Governance) score of Refinitiv Eikon's was selected. This score is an aggregate value that measures a company's ability to implement sustainability-oriented, providing a holistic measure of its alignment with Sustainable Development Goals. The metric system is based on a scale ranging from A to D, with values ranging from 0 to 100, to assign a company score. Companies with an A to B score, or between 50 and 100 in numerical terms, demonstrate a strong organizational commitment to sustainability issues. This includes ethical and sustainable business practices, socially responsible initiatives, and management structures that support these goals. Conversely, scores between C to D, or between 0-50 in numerical terms, are attributed to companies with little involvement in sustainable issues and, therefore, a lack of implementation of sustainability principles at the heart of organizational processes.*

***3) Control Variables:** To account for external influences, the SDG index (Sachs et al., 2019) was included as a control variable. The index was developed in 2016 by SDSN to evaluate the progress of different countries over time in achieving the Sustainable Development Goals (SDGs). It serves as a tool to guide public policies and encourage more sustainable behaviors. Moreover, it may have both direct and indirect effects on corporate sustainability performance. Additionally, company size, measured by the number of employees gathered from "the ORBIS" database, was used as a second control variable. As larger companies often have better infrastructure, advanced technology, and more financial resources to invest in sustainability projects, this metric was used to prevent the result from being biased by factors related to the companies' dimensions.*

Tab. 1: Description and operationalization of variables

Variable	Code	Variable description	Operationalization
Independent variable	***SDG_Presence***	Captures the presence of references to the Sustainable Development Goals (SDGs) in firms' mission statements.	Binary variable: "1" if SDG references are present in the mission statement, "0" if not.
Dependent Variable	***ESG_Score***	Measures corporate commitment to sustainability, focusing on environmental performance, social responsibility, and governance practices.	ESG Scores range from A to D, with A-B indicating high sustainability performance and C-D indicating marginal engagement. Numerical values between 50 and 100 were assigned to A-B companies. Numerical values between 0-50 were assigned to C-D companies.
Control Variables	***SDG_index***	Reflects the environmental, social, and governance context of the country where the company operates.	SDG_index at the country level accounts for sustainability-related regulations, policies, and cultural values. Controls for the influence of external contextual factors on firms' environmental performance.
	Num_Emp	Proxy for firm size, as larger firms often have more resources and face greater scrutiny when adopting sustainable practices.	Measured by the number of employees. Controls for the effect of operational scale on environmental performance, ensuring focus on the specific impact of SDG integration in mission statements.

Source: Authors elaboration

Results. *Our findings reveal a significant positive relationship between references to the Sustainable Development Goals (SDGs) in company purpose statements and the Environmental, Social, and Governance (ESG) scores of the firms. Specifically, for every one-unit increase in SDG mentioned in the purpose statement, the ESG score rises by 0.694 when other variables - SDG Index and Company Size - are controlled for. The statistical significance of the relationship is also underlined by the p-value associated with the coefficient of the variable SDG presence, well below the conventionally established threshold (p=0.05). This result allows us to conclude that companies incorporating SDG references in purpose statements tend to perform better in sustainability metrics. Additionally, the variable "company's size" was found to have a positive and significant impact on ESG score, suggesting that larger firms (based on employee number) tend to achieve better sustainability outcomes. Even though the effect of "size" is modest, it underscores the critical role of a firm's dimension in shaping ESG performance. An interesting result was found between the variable SDG Index and the ESG score of the analyzed companies. In particular, a significantly inverse relationship between the two variables*

was found, that means a one-unit increase in a country's SDG Index was linked to an average decline of 1.111 in company ESG scores, suggesting that a higher national SDG ranking does not necessarily translate to better corporate sustainability performance. The overall model fit is strong, with an R-squared value of 0.9949 and an adjusted R-squared of 0.9948, indicating that the included variables explain nearly 100% of the variation in ESG scores. The F-statistics (2.175e+04, p < 2.2e-16) confirms the model's overall significance and its ability to accurately explain the observed relationships. Furthermore, the residual standard error (0.999, with 336 degrees of freedom) suggests minimal deviation between observed and predicted ESG scores, further validating the model's reliability.

Tab. 2: Variables Description

Variable	***Min***	***Max***	***Mean***	***Median***	***S.D***	***Skewness***	***Kurtosis***
ESG_score	9.62	92.83	59.30	59.52	18.287	-0.368	-0.533
SDG_Index	76.81	86.35	82.20	82.76	2.60752	0.0014	-1.270
Num_Emp	1.03	271292.00	17540.18	3616.50	37019.77	3.533	14.162

Source: Authors elaboration

Tab. 3: WLR results from R statistic

Coefficients	**Estimate STD.**	**Error**	**t value**	**Pr (>|t|)**
ESG_score	1,47E+05	1,86E+03	78.864	< 2e-16 ***
SDG_presence	6,94E+02	1,40E+02	4.958	1.13e-06 ***
SDG_Index	-1,11E+03	2,29E+01	-48.570	< 2e-16 ***
Num_Emp	1,91E-01	1,55E-03	123.591	< 2e-16 ***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 Residual standard error: 0.999 on 336 degrees of freedom Multiple R-squared: 0.9949, Adjusted R-squared: 0.9948 F-statistics: 2.175e+04 on 3 and 336 DF, p-value : < 2.2e-16				

R statistics software

Research limitations. *Although the study contributes to advancing the research field, it has limitations. First of all, the study uses the ESG score as a primary indicator of sustainability performance. While ESG score offers a broad overview of a company's sustainability efforts, they may not fully capture the depth and scope of a company's commitment. The ESG indicator aggregates various dimensions of corporate sustainability, potentially overlooking specific initiatives or outcomes directly related to one of the three pillars. Additionally, the sample analysis is confined to European companies operating in the manufacturing sector. Due to this narrow focus, the generalizability of the findings could be affected. Future research might explore similarities across various industries or expand the study to other geographic areas. This would facilitate a more comprehensive understanding of the guidance role of corporate purpose in different sectors and would also reveal how global sustainability goals are adapted in different local contexts. Lastly, our findings indicate a negative correlation between national SDG commitments (as measured by the SDG Index) and companies' ESG scores. This raises important questions about macro-environmental factors and suggests the need for further investigation that might explore how different national policy frameworks, both regulatory and voluntary, influence corporate sustainability strategies.*

Managerial implications. *Our study offers policymakers and corporate managers practical insights that, if adopted, could potentially accomplish the achievement of Sustainable Development Goals (SDGs) and strengthen the role of firms in sustainable development.*

For corporate managers, our findings indicate that aligning corporate purpose with the 17 SDGs is not just an ethical responsibility but a strategic advantage. Companies that explicitly integrate SDGs into their mission statements tend to achieve higher Environmental, Social, and Governance (ESG) performance, strengthening their market positioning, investor confidence, and stakeholder trust. By embedding sustainability at the core of corporate strategy, firms can enhance resilience, drive long-term financial success, and gain competitive advantages in an increasingly sustainability-conscious global economy. For policymakers, the findings highlight the need for stronger regulatory frameworks that promote corporate accountability and transparency in sustainability commitments. Governments and regulatory bodies can foster authentic SDG integration by implementing stricter ESG disclosure requirements, incentivizing sustainable innovation, and developing standardized sustainability metrics. Additionally, public-private partnerships can bridge gaps between corporate initiatives and societal needs, ensuring that sustainability commitments translate into tangible progress. By creating a policy environment that encourages substantive corporate engagement with the SDGs, policymakers can drive systemic change and maximize the role of businesses in achieving sustainable development objectives.

Originality of the paper. *Current literature widely recognizes the role of corporate purpose as a critical driver of organizational behavior and strategic guide toward long-term value creation. While most studies have focused on its contribution to fostering stakeholder trust, organizational resilience, and the improvement of financial performances, less emphasis has been placed on how the explicit integration of SDGs within a company's "manifesto" can influence*

sustainability performance metrics. Our study aims to fill this gap by exploring the real effectiveness of mission statements as sustainability communication tools, and how the incorporation of the SDGs within them can shape strategic decision-making and operational priorities, leading to higher sustainability performance.

It provides empirical evidence that including references to the SDGs in companies' purpose statements can be an effective strategy for aligning business objectives with global sustainability priorities. It also reinforces the idea that purpose-driven organizations can play a central role in achieving Sustainable Development Goals by 2030.

Key words: *Corporate purpose; SDGs; ESG performance; manufacturing firms; Europe; WLS regression*

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The Impact of Green Training on Workforce Behavior, Environmental Performance, and Reputation: A European Study

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Abstract

The challenges of digitization, the green transition, and demographic trends in Europe have significantly impacted the labor market. In particular the request of green talent from the demand side has grown enormously, making mandatory to reskill and upskill the workforce to address the green skill gap. In this scenario employees' green training, a key element of Green Human Resource Management (GHRM), has become fundamental to align employers requests and employees working profile availability. This study examines the impact of green training for the existing workforce in the European business context, focusing on its influence on the green working climate and its mediating role in enhancing firms' environmental performance and green reputation, enabling organizations to anticipate green trends, driving the transition. The paper explores the role of green training through an online survey, focused on the agri-food, construction, manufacturing, wood and furniture industries, and public administration, strategic sectors within Europe. Findings indicate that green training positively contributes to fostering a green working climate within the surveyed European firms, reinforcing the importance of structured training programs in supporting sustainability-oriented business practices. Moreover the study indicates that green working climate positively impacts on firm environmental performance and green reputation.

Framing of the research. *The recent challenges imposed by digitization and green shift, as long with the European demographic trend, have impacted deeply different dimensions of society, including the labor market (Cedefop, 2024). The effect has been witnessed by drastic changes in terms of demand and offer of job opportunities, as well as the increase of the labor shortage (Innerhofer, Nasta and Zehrer, 2023) that has affected different European sectors. Moreover, the assessment of the impact of green transition on the labor market is made more difficult by the geographical distribution of workers (Vona, Marin and Consoli 2018; Dussaux, 2020), the dependence of countries 'GDP on high polluting industries, the classification used to define the concept of green jobs and the level of labor intensity of the industries majorly impacted by the transition (Causa et al., 2024). Between all these issues, what stands out is the general unalignment between employers' requests and employees working profile availability (Linkedin Report, 2023), along with the necessity to address the recurrent green skills gaps requests (Renfors, 2024) to satisfy the requirements imposed by the green transition. Moreover, the necessity to achieve the ambitious climate targets imposed by public institutions without compromise the general wellbeing and potentially expose the current workforce to vulnerability, makes mandatory to adequate the skills requests to the new policies (Borgonovi et al., 2023). Understanding the skills needed for reskilling and upskilling in low-emission economies is crucial for workforce redistribution (Draca et al., 2021). Equally important is assessing the gap between required and existing skills to determine reallocation costs (Gathmann and Schönberg, 2010; Kambourov and Manovskii, 2009). Redefining workers competences is essential for labor market resilience, reducing vulnerability to external forces and market fluctuations (Borgonovi et al., 2023). This requires considering job obsolescence, supply chain pollution levels (Vandeeplas et al., 2022), and sector-specific impacts. According to recent studies the request of green skills from the demand side has grown enormously (Nikoloski et al., 2024; Sulich and Soloducho, 2022) aligning with the policy makers objectives and following the trends imposed at European level by Agenda 2030, the Sustainable Development Goals (SDGs), the European Green Deal, the Fit for'55 directive, the Net Zero industry Act for decarbonization, and the revision of the Waste Framework Directive in 2024. Moreover, the requirements imposed by green transition will have a neutral or generally positive quantitative impact on the labor market (Business Europe 2021), even if some sectors would be dramatically impacted because of the increased*

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sector mobility towards more "green friendly" ones. Despite this, it is difficult to define a worldwide general employment trend since labor market policies vary widely across countries (Chateau. Saint-Martin and Manfredi 2011). However, what stands out is that, despite the optimistic forecasting, there has been a significant misalignment between the demand for green skills from employers the availability of skilled workers over the last 5 years (Global Green Skills Report, 2022). Without this adjustment the gap between demand and offer of green talents is expected to grow globally even higher until the 101, 5% by 2050 (Ferrazza, 2025). Moreover, the adaptation process to the new requirements imposed by green transition is made even slower by the difficulty of the employees to acquire adequate expertise and knowledge to improve the level of sustainability of organization performances and products (Pinzone et al., 2019). For these reasons Green Human Resource Management (GHRM) plays an important role in supporting firms in the achievement of a green transition. GRHM has been analyzed, in the hospitality industry, through the lenses of Resource Based View (RBV) theory and Stakeholder theory, revealing a correlation with circular economy and consequently with green organizational culture, and internal and external resilience and witnessing its role in promoting long term firm sustainability (Elshaer et al., 2024). GHRM is associated to programs, techniques and processes that are implemented in the workforce tasks to reduce negative environmental impacts and achieve a better environmental performance (Arulrajah et al. 2015). This aim is reached thanks to the three major component of GHRM: selection and recruitment, training and development, compensation and rewards (Zihan et al., 2024). According to Jackson et. al. (2011), training and forming employees is a key component of GHRM especially in the middle of a change process, associated to green and digital transition, like the one Europe is currently facing.

Our analysis is focused on green training component based on the Human resources studies related to the AMO Framework (Marin-Garcia and Tomas, 2016), which shares a common foundation with GHRM (Vasquez Brust et. al., 2022). The AMO acronymous that stands for Ability, Motivation, Opportunity Theory originally developed by Bailey (1993), refers to the components that are considered essential to promote the high involvement and high-level performances of employees inside a firm. The first dimension, ability, is related to the owing of knowledge and skills that lead to the correct performing of a certain job. This can be enhanced by specific recruitment techniques and selection, development and formal training (Raidén et al., 2006). Green training can be defined as a type of training that is related to relevant environmental topics, which lead the staff to the integrations of firm's performance with environmental issues (Teixeira et al., 2016). It is also a process of continuous education that aims to increase employee's ability to acquire environmental sustainability knowledge and develop a spontaneous green behavior over time (Liu et al., 2020). The correlation between GHRM and firm environmental performances has already been deeply explored in academic South Asian literature (Ren et al. 2018). Wu et al., (2020) have highlighted that organization that adopt an Environmental management system obtain significant economic benefits. The ability to create an internal culture based on skilled and engaged people completely committed to the environmental cause and aligned with firms' main goals inevitably leads to an elevated environmental performance trough the promotion of shared green behavior (Sarfo et al., 2024).

Purpose of the paper. *The present study explores the impact of green training that involves current workforce, inside European business context, on green working climate (GWC) and the mediating role of this dimension in promoting better firms' environmental performances and better firms' green reputation addressing the needs imposed by green transition. The paper aims to assess the efficacy of green training in promoting the resilience of firms and help organization achieve better performance by anticipating the green trends and assuming a pivotal role in the promotion of the transition. The research focuses in particular on agri-food, construction, manufacturing, wood and furniture industries and Public administration, that are strategic sectors of the variegate European business tissue and that are targeted inside the survey used to gather data. Despite the evident necessity of green skills to perform a long-term transition and adaptation of traditional business both public institutions (OECD/CEDEFOP, 2024) and academic researches (Xie et al. 2020) have portraited a specific scenario of misalignment between demand and offer on the labor market that can be potentially fulfilled by green training. From an institutional perspective and considering existing research gaps, this paper examines whether green training, a key component of Green Human Resource Management (GHRM), enhances firm resilience by directly shaping the internal climate. As the primary beneficiaries of this process, employees contribute to a GWC, which serves as a mediating factor for firm performance and reputation. According to our hypothesis the paper aims to address the following questions:*

RQ1: How much green training influence firm's internal working climate fostering workforce green behavior?
RQ2: How much green working climate mediates the impact of green training on environmental performance of firms?
RQ3: How much green working climate mediates the impact of green training on green reputation of firms?

The research questions correspond to three major hypothesis, following detailed. The implementation of clean environmental strategy must be supported by an adequate green human resource management and consequently an important training system that can create an internal GWC and engagement (Cherian and Jacob, 2012). For this reason, the first hypothesis is: H1 Green training positive influences GWC.

A recent study (Sarfo et al., 2024) has shown a significant correlation between the adoption of GHRM practices and firm environmental performances. What stands out is that the acquirement of new knowledge and specific competences related to environmental sustainability topics can lead to an enchanted and higher competitiveness of the organization (Obaid, 2015). The ability to create an internal culture based on skilled and engaged people completely committed to the environmental cause and aligned with firms' main goals inevitably leads to an elevated environmental performance

through the promotion of shared green behavior (Sarfo et al., 2024). For this reason, the second hypothesis is: H2 GWC positive influences firms' environmental performance.

Practicing substantial environmental sustainability can lead to perform in a less impactful way on the environment but also acquire good reputation between different types of stakeholders and investors (Ervin et al., 2013) who care for the same values (Cable and Turban, 2003; Brammer and Pavellin, 2006; Yoo, 2021). The propensity of working for a company that follows the environmental sustainability principles and the support received by companies that adopt sustainable behaviors throughout the supply chain has been also confirmed by Merlin and Chen (2022) and by Marrucci, Daddi, and Iraldo, (2021), Daddi et. al (2019). An internal climate that is compatible with sustainability principles and a strong engagement and commitment of workforce to environmental sustainability leads to the perception of an external positive public esteem. Businesses' managers can make employers an active and proactive part in the external promotion of a sustainable behavior trough the idea of the green employers external branding (Sulich, 2021). The success in the implementation of green strategies depends on the internalization of the green principles by the employees who, if adequately involved, can assume a proactive behavior in the external promotion of the firm. These considerations provide the base for our third hypothesis: H3 GWC positive influences firms reputation

Methodology. *The data have been collected from a sample of European firms located in Bulgaria, Italy, Belgium, UK, Spain, Finland, coming from different strategic sectors (majorly manufacturing, construction, agri-food, wood and furniture, public administration). To achieve the maximum diffusion of the survey the selection of the respondents has been performed trough a non-probability sampling methodology, convenience sampling (Galloway, 2005), useful since the population is extremely big and really complex to be defined and reached (Etikan et al., 2016). The responses have been collected between May and August 2024. The items used in the survey have been measured with a 5-point Likert scale, ranging from 5=strongly agree to 1= strongly disagree. Two items have been also used to measure firms' green performance (S., Hadi et. al. 2023), focusing on environmental performance that are related to material use and waste management and that for this reason can be adapted to different industries, while four items have been used to assess firms' green reputation with different types of stakeholders throughout the entire value chain (Marrucci, Daddi, and Iraldo, 2021; Daddi et. al 2019). The explanatory variable is the dichotomic variable Green Training (GT) that ranges between 1, if the organizations are already performing green training activities and 0 if they are not doing them. To assess the presence of possible differences of GT effect, countries and industries have been also adopt as control variable. GWC acts both as a dependent variable when the relation with GT is assessed and also as a mediating variable for the relation with GP and GR. This study adopts it as the mediating variable since the direct impact that green training has on it and its ability to vehicle the indirect effect on GT on firm environmental performance's and reputation. The analysis has been performed trough the application of regression analysis, to measure the level and strength of the correlation between the application of green training programs inside the organizations and the results obtained in terms of green internal climate and then its moderating effect on performance and reputation. All the analysis as been performed using STATA software.*

Results. *The first hypothesis, that aim to verify if green training positive influence working climate, is verified. This result is particularly important since despite the numerous study that attribute a general positive influence of green training on employees' behavior, some studied have identified a possible negative impact due to the pressure created by the added overload created by the learning activity (Pinzone et al., 2019; Oppenauer and Van De Voorde, 2018; Topcic et al., 2015). The second and third hypothesis that aim to assess the mediating role of GWC - so if it can vehicle the positive effect of green training, associated majorly to personal behavior, to the organizational dimension trough the impact on environmental and reputational performance - are both verified. The extremely high value of R2 demonstrate an important representativeness of the models and of the analysis used. From the tests performed it is noticeable that green training is not only a key variable from an institutional of view (CEDEFOP, 2023; Business Europe, 2022) but represents also an important leverage spendable in the field of long-life learning to promote a readaptation of the working profile to the needs of the green transition. The implementation of a well-structured training program that addresses skill gaps at the European level will equip employees with the necessary abilities, knowledge, and competencies (Fernando et al., 2019), fostering personal development (Xie et al., 2020) and encouraging proactive behavior (Gusmerotti et al., 2023). This approach not only aligns with environmental trends but also promotes a mindset of eco-innovation, leading to what can be termed a "new green empowerment", which serves as a foundation for enhancing firms' green performance and reputation. The present paper aims at confirming the efficacy of green training in promoting and environmentally friendly working climate and define how it can represent an antecedent for organizational performance, justifying the efforts made by firm to invest in it and help build resilience overtime. According to the previous inferences it is possible to state that green training has a positive impact on the green working climate inside the sample of European firms who took part to the survey. This means that a lifelong learning process as stated by European Union (Council of EU union, 2022), is significant to address the green transition issue and guarantee sectors resilience and adaptability to the new market needs. What seems to be even more important from the analysis conducted is the mediating role assumed by GWC respect to Green performance of the organizations and their green reputation. Both the relationships are statistically significant, showing a great reliability of the results and a strong correlation. Our results reveal that the role of a mediating variable like GWC is extremely important for multiple reasons. First, our work has evaluated the effect that green training has directly on the "personal" component of the organization, that is workforce and then used the internalization of the behavior acquired by the employees to test the effect on organizational variables like the effective*

green performances of the firm and the perception that external stakeholders have of the overmentioned behavior. This confirms and extends what literature (Ren et al., 2018; Pinzone et al., 2016) has already claimed. The adoption of effective actions, like green training, suited to sustainability create a better internal working climate and avoid the risks of green washing effect and formal or superficial adoption of environmental friendly behavior (Boiral, 2007) and this is reflected substantially by a better environmental performances of the organization (as reflect by the relation between GWC and GP) but also by the image that it is given outside (as reflected by the relation between GWC and GR). The contraposition between the personal dimension of the effect of green training, also according to the AMO framework introduced in the initial section of the study, that directly affect the behavior of the learners makes necessary to introduce GWC has a mediating variable. Moreover, the present study gives the opportunity to observe the relations between the variables on a large scale comparing different European countries and different contexts. The adding of the control variables has indicated that GT produces positive effect on the organization internal climate despite the geographical or sectorial collocation of the organization which instead has a consistent weight when it come come to green performance and reputation.

Research limitations. *This study has some limitations, though they do not diminish its relevance. First, the use of convenience sampling ensures a large sample, but results are not evenly distributed across countries. Second, while the link between green working climate (GWC) and green training is statistically significant, the low R2 value indicates limited predictability. This is expected, as green training mainly affects the ability component of the AMO framework, while other factors were not considered. GWC is shaped by multiple influences, including external pressures (Duan et al., 2020), firm-specific factors (Flagstad et al., 2022), and incentives (Arhavbarien et al., 2024). Nonetheless, the study confirms the significant positive impact of green training on the internal organizational climate, reinforcing its key role in the green labor market transition. The present research aims to raise the attention on the role of training and its impact on GWC as an important leverage of firm capacity to adapt to the challenges imposed by climatic pressure and policymakers' requests, maintaining and possibly gaining competitive advantage over time. Possible research paths could be related to the exploration of the role of green training focusing on further specific dimension and distinction (for example different training modalities) or perform longitudinal case study focusing on a specific country or a specific industry or even making comparison related to the moderating role of GWC between two specific countries other then European context.*

Managerial implications. *The paper highlights the power of green training in address the challenges of the green transition without leaving anyone behind, directly, influencing the firm's workforce and indirectly on firm's performance and reputation, helping building resilience overtime. Companies should constantly monitor and assess the level of preparation of their internal workforce and set a specific training program that impose to maintain the workers constantly updated according to market trends and policy requirements, building an internal culture that promotes resilience and consent to scale up and capitalize new knowledge, performing a smooth green transition aligned with sustainability principles.*

Originality of the paper. *The paper aims to explore the role of GHRM in supporting green transition by focusing on one of its components, green training and its role in aligning labor market demand and offer according to green transition need. Moreover, the paper analyses the role of GWC as a mediating variable for green performance and reputational and their overall impact on firm resilience inside a multisectoral business context.*

Key words: *Green Human Resource Management, Green Training, Green Skills, Green transition, Firm resilience*

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Control Points Perspective in Environmental Business Strategies: Corporate Roles in Shaping Sustainable Markets

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Abstract

The climate crisis necessitates a shift in production and consumption patterns, requiring a reconfiguration of traditional markets to align with sustainability principles. This transformation introduces unique challenges for companies operating in sustainability-oriented markets including technological disruption, regulatory shifts, unpredictable customer behavior, financial constraints, and strategic inertia such as waiting games. While the literature on market shaping identifies firms as pivotal agents in the formation of new markets it is less clear whether firms can truly act as catalysts for sustainability-oriented markets. The additional complexities inherent in these markets raise questions about whether and how firms can effectively navigate these challenges to drive the formation of new market models without compromising their competitive positioning. To address this gap, we use a control point perspective to analyze key positions within the value network where firms can generate systemic value while ensuring future value capture. Our case study of nine key firms in the emerging green hydrogen market in Italy reveals how market-shaping roles - Market Drivers, Market Supporters, and Market Missionaries - navigate challenges of value creation and capture by exploiting different configurations of control points. Additionally, we identify specific positioning mechanisms that provide deeper insights into the agentic role of actors driving the transition to sustainable markets.

Framing of the research.

- ***Introduction:***

Strategic marketing and management studies emphasize the importance of market-shaping mechanisms in the evolution of industries (Helfat, 2021; Nenonen et al., 2020). Assuming the market as a dynamic, plastic, multi-actor system (Nenonen et al., 2014; Storbacka, 2019), this perspective acknowledges how such systems can be shaped by the actions of their constituent actors (Mele, Pels, & Storbacka, 2015; Nenonen et al., 2014).

Consequently, the recognition of the pivotal role of firms in shaping new markets (Nenonen, Storbacka, & Windahl, 2019) has prompted an increasing number of scholars to question the role of business agency in sustainability transitions (Novalia et al., 2018; Werbeloff et al., 2016), emphasizing the need to investigate the role of businesses as potential catalysts for the transition towards sustainability-oriented markets (Mintrom & Rogers, 2022; Schaltegger et al., 2022; Koistinen & Teerikangas, 2021).

However, while shaping new markets subject to traditional market dynamics, is already an inherently demanding endeavour for any firm, a company's role as a catalyst for a sustainability-oriented market constitutes an exceptionally complex and strategically significant challenge.

Pinkse et al., (2023), categorize the unique constraints that companies operating in emerging markets focused on sustainability face as follows: (i) limited availability of low-carbon substitutes, (ii) the need for new infrastructures, (iii) difficulties in using existing production facilities with low-carbon inputs, and (iv) challenges in delivering the same quality or quantity of output at a comparable price when using low-carbon inputs.

A review of the literature on market shaping for sustainability revealed a paucity of studies that do not provide a comprehensive description of the phenomenon. The few exceptions mainly explore how the incumbent actors prepare the market for the replacement of existing technologies with more sustainable ones (Doganova & Karnøe, 2015; Keranen et

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al., 2023; Werner et al., 2022) or how market systems are collectively shaped in order to promote social change in an emerging economy (Kullak et al. 2022).

In light of this, recent research has underscored the need to extend the conceptual scope of market shaping beyond a traditional focus on economic improvement to encompass sustainability (Koistinen & Teerikangas, 2021; Sheth & Parvatiyar, 2021), highlighting the need for further research to balance the business and sustainability objectives of shaping strategies (Werbeloff et al., 2016; Köhler et al., 2019; Stathakopoulos et al., 2022).

We posit that the control point perspective provides an excellent lens through which to explore this phenomenon. This perspective enables to consider simultaneously the positions in the value network that companies need to manage to create and capture values.

By integrating this perspective in the process of formation of new sustainable market, it becomes possible to understand how firms can foster harmonious value creation aligned with sustainability objectives, while strategically managing ecosystem positions that hold the potential for long-term profitability.

This paper thus addresses the following research question:

(i) What control points are adopted by shaping companies to overcome sustainable market constraints and capture value?

(ii) What mechanisms do shaping companies use to position such control points within emerging sustainability-oriented markets?

To our scope, we conducted a multiple case study involving several actors engaged in developing the emerging green hydrogen market in Italy. Using a qualitative approach, our study identifies the roles of companies in market-shaping and how they shape a sustainability-oriented market.

Our study contributes to the literature by extending market-shaping research with empirical evidence in sustainability, uncovering patterns in control point development and management, and offering insights into the roles and dynamics of actors driving the transition to sustainable markets.

Purpose of the paper.

- ***<u>Theroretical Background</u>***

<u>Market shaping and companies' roles:</u>

The agentic effort of companies is nowadays considered as a significant driving force in strategic management, as it influences the evolution of an operating environment (Helfat, 2021) and highlights the potential role of a focal company in shaping a new market (Nenonen and Storbacka, 2021). Recognizing the firm not as a passive actor within the market system, subject to external and deterministic forces, but as a proactive entity capable of deliberately driving market change (Nenonen and Storbacka, 2021), highlights the critical role firms might have in the creation of new market models oriented toward sustainability. The market-shaping literature thus offers a valid lens to study the formation of a sustainable market, and specifically focuses on the agency of different actors (Ottosson et al., 2020).

Different players participating in the shaping process use different approaches and levels of engagement in creating a new market system (Nenonen, Storbacka, and Windahl 2019). The engagement of a focal company in creating a new market and its ability to involve as many market actors as possible has been used to cluster different market shaping roles (Fehrer et al., 2020).

Recent findings (Flaig and Ottosson, 2022) shown that roles are determined by the actions of a focal actor and the responses of the other actors involved (Nystrom et al., 2014). Such actions determine what resources are accessed and utilized, which actors to collaborate with, and which networking objectives to be pursued to engage a broad number of players (Nystrom et al., 2014). Flaig and Ottosson (2022) identified the roles involved in market shaping domain based on the different levels of engagement exerted by the actors. These roles are:

- *Market Drivers who outline a market vision and allocate significantly more resources than other actors to realise this vision. These actors steer market-shaping process driven by the possibility of reaching a leading position in the new emerging ecosystem. These players have a profound commitment to the creation of the new market.*
- *Market Supporters are companies who endorse this vision and do not interfere with the Market Drivers' shaping efforts. These companies facilitate the education of the market regarding the advantages of the nascent ecosystem, thereby enabling the positioning of their products and services within a novel market segment. Compared to the Drivers, Supporters have limited resources, and thus they leverage opportunistic partnerships to drive sales growth.*
- *Market Missionaries are crucial in developing market networks and promoting the market vision to a broader audience. Often funded by industry or government, they act as proxies for other actors' market-shaping efforts, extending these ambitions in line with the focal vision (cf. Mountford, 2019).*

However, a thorough understanding of how these roles operate within a sustainable market is lacking. A deeper investigation of the roles' underlying actions to achieve economic and environmental equilibrium in sustainable market-building would contribute to overcoming the current fragmented literature on shaping sustainable markets (Nenonen & Storbacka, 2021).

<u>Control point perspective:</u>

Control points are defined as abstract positions of greatest value and control within a given business ecosystem, thereby inherently introducing a "systemic dimension" to these positions (Pagani, 2013). Such positions are not

necessarily within the firm boundaries but are placed between layers on the layered architecture of a value network (Yoo et al., 2010). According to this approach, companies first identify the assets, technologies, or industry-level value systems that could create market value. Subsequently, they develop and occupy these positions to exert dynamic control, ensuring future value capture dynamics (Baldwin & Woodard, 2007; Baldwin, 2015; Hannah & Eisenhardt, 2018).

Control points can be technical, above all identifying the potential value creation in the various layers of an ecosystem, and strategic, by determining the value capture potential (van Dyck et al., 2021). Technical control points refer to technical solutions that enable access to a company's market, while strategic control points encompass sociological and institutional aspects which help the company to benefit from the ecosystem.

As with the value creation dynamic, control points are therefore useful for understanding how firms guide the evolution of the value network, creating value at a systemic level (Hannah and Eisenhardt, 2018; Helfat and Raubitschek, 2018). With respect to the potential for value capture, establishing control points within an emerging business ecosystem involves the identification and occupation of strategic positions in advance to gain control of the ecosystem with the goal of capturing value (Dattè, 2018).

Purpose and objective of the study:

The control point perspective provides a valuable lens for understanding how companies balance sustainable markets shaping actions (value creation) with enhancing competitive advantage (value capture). Therefore, this study aims to integrate the control point perspective into the phenomenon of shaping sustainable market, seeking to extend the market-shaping literature by highlighting differences among actors and identifying recurring patterns that reveal the unique characteristics of each role in shaping sustainable markets.

Methodology.

- ***Setting:***

The burgeoning green hydrogen market in Italy is an optimal setting for analysing the shaping of an emerging sustainability-oriented market.

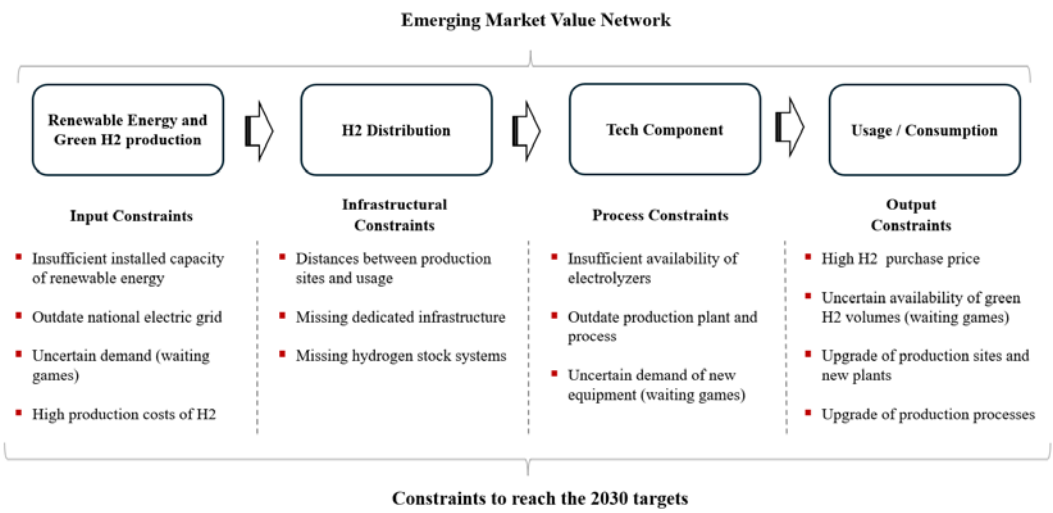
The development of the green hydrogen market is hindered by several issues (IRENA, 2022; IEA, 2022) tied to input, process, and output constraints, which are common to emerging sustainable markets (Pinkse et al., 2024).

These constraints include limited large-scale hydrogen production to ensure competitive supply, the absence of high-capacity transport infrastructure like pipelines, and the need for new or upgraded equipment to integrate hydrogen into industrial processes. Additionally, hydrogen's higher costs compared to fossil alternatives and its impact on maintaining quality in certain production processes pose significant challenges (IPCC, 2022, Nunez-Jimenez et al., 2022).

Despite the numerous complexities associated with this emerging market, many corporate actors are currently dedicating significant resources and efforts to building it.

All things considered, this setting is particularly suitable for investigating the actions taken by companies entering a distinctive and promising emerging market and their efforts to shape it. ***Figure 1*** *shows the value network layers used to achieve the 2030 target, highlighting the main constraints companies will have to face.*

Fig. 1: Green hydrogen value network's layers and associated constraints



- ***Data collection:***

To identify the firms that are active in this emerging market, we began with the IEA dataset, which catalogs the hydrogen projects launched since 2000 and the respective companies leading them. We supplemented this with a list of companies affiliated with associations such as the European Hydrogen Alliance and H2IT, and we also attended the

Hydrogen Energy Summit & Expo in Bologna (October 2022), which is the key industry event in Italy attended by major stakeholders.

To determine the companies most committed to shaping this market, we applied criteria including declared investments in the emerging market, ongoing projects impacting the national supply chain, and public statements to shareholders. This approach identified nine companies extensively engaged in large-scale industrial initiatives to advance green hydrogen development, with investments totaling several million euros. These actors are recognized as key actors in this emerging market, given their potential to revolutionize the entire Italian hydrogen supply chain (e.g., Osservatorio H2IT). We contacted these companies, requesting interviews with representatives who were extensively involved in hydrogen projects, as well as senior executives responsible for the company's strategic direction. Between October 2022 and September 2023, we conducted interviews via Teams with a total of 22 interviewees (see ***table 1****).*

Tab. 1: Overview of the interviewees and their company activities

Company Profile / Pseudonym	**Interviewees**	**Market shaping initiatives**
Energy Hubs Developer	COO; Head of strategy; Head of market development	- Coordination of an industrial district for the use of green hydrogen - Development and management of renewable energy hubs dedicated to H2 production and direct interconnection with off-takers.
Energy Company A	Head of H2 BU; Head of special projects; Project manager	- Development of hydrogen valleys - Coordination of H2 mobility initiatives and H2 refuelling stations development - Collaboration to develop H2 supply and usage in hard-to-abate sectors (ceramic, steel, glass etc)
Energy Company B	Head of Strategy; 2 Project Managers	- Development of renewable power plants dedicated to H2 production - Orchestration of multiple H2 pilot projects in collaboration with hard-to-abate (e.g., refinery, chemical) - Development of a national platform to test new H2 technologies to involve startups, and industrial off-takers and create networking
Gas Distributor	Head of H2 BU; Head of decarbonization BU; H2 Project Leader	- Upgrade and replacement of gas pipelines to enable national H2 supply - Launch of a new company in collaboration with electrochemistry partner to develop an electrolysers gigafactory - Coordination of a multiparter project to develop H2 rail mobility - Collaboration with hard-to-abate players (steel and refinery) to test H2 integration into production cycle
EPC Contractor A	CEO; Business model developer	- Development of new H2-based technologies for steel making - R&D collaboration with steel producers - Development of an in-house lab to test new technologies with potential clients
EPC Contractor B	Coo; Head of engineering	- Development of new H2-based technologies for metal heating - Technical support for pilot projects aimed at decarbonizing ceramic and metallurgical industries.
EPC Contractor C	Head of strategy; Project Manager	- Development of new H2-based technologies - Partnerships with H2 valley developers to test new hydrogen storage models - R&D collaboration with city councils to develop hydrogen mobility projects.
Steelworks Company	President and Coo	- Multi-partners alliance to decarbonize production cycle integrating H2 (DRI technology) - Dissemination of ongoing results internationally to position the initiative as an industrial alternative in the steel sector. - Interactions with policymakers to guide regulatory development and establish a supportive framework for H2 usage initiatives.
Refinery Company	Head of strategy; Project Manager	- Multi-partner alliance to manage the production, distribution, and direct use of green H2 in crude oil processing. - Lobbying in Italy and the EU to unlock funding for industry decarbonization. - Committed to buy and use large volume of hydrogen on a long-term horizon, thereby enabling large-scale H2 production in the reference industrial district.

- ***Data Analysis:***

First, we followed Gioia et al. (2013) for inductive reasoning, deriving first-order codes that closely represented our raw data (Gioia et al., 2010). Our raw data comprised approximately 280 pages of interview transcripts, which were analysed using the qualitative data analysis software NVivo. The analysis of interview transcripts was an iterative process that led to the identification of 32 first-order themes relevant to the subsequent identification and description of ***control points****.*

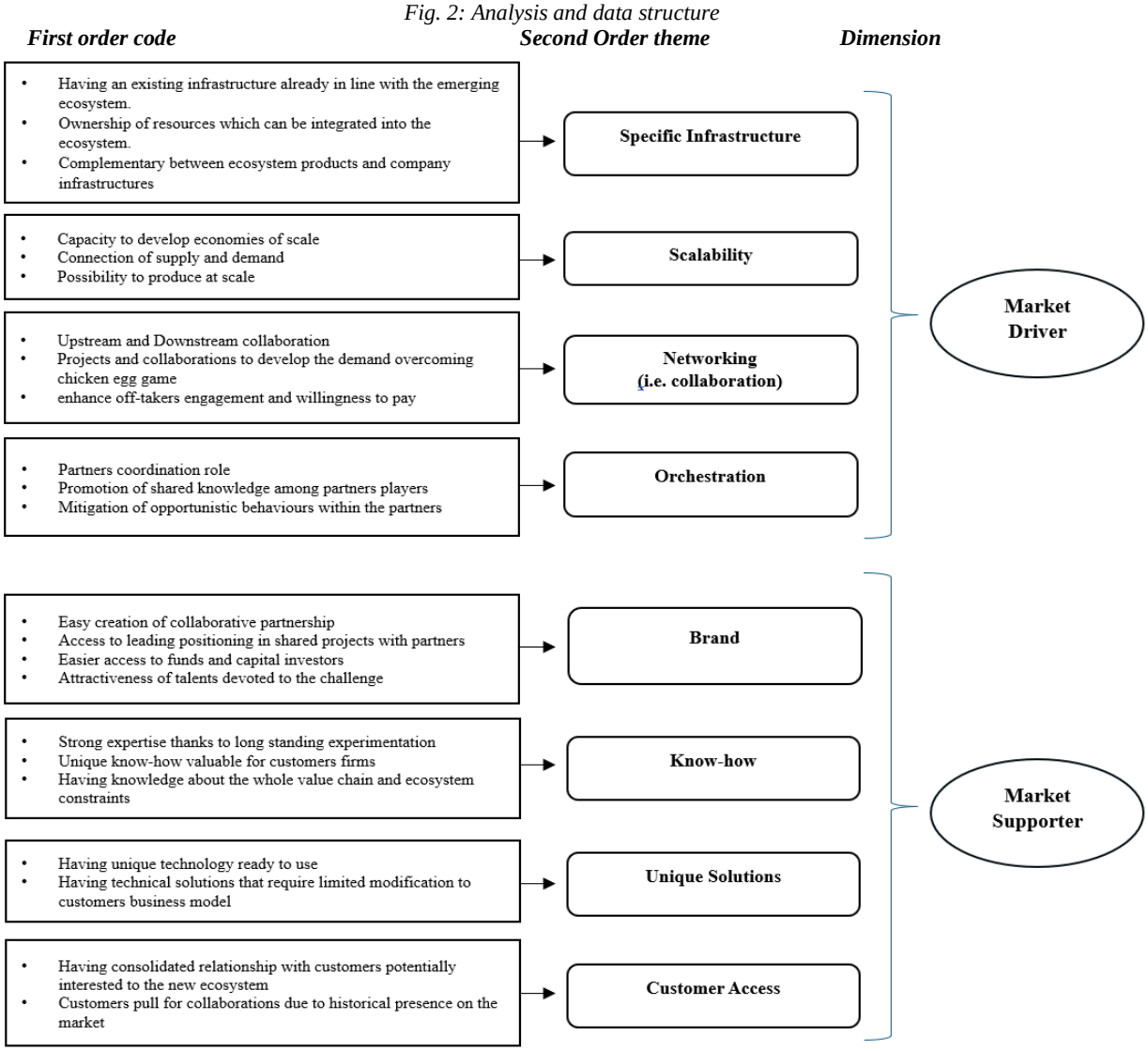
In the second step, we used deductive reasoning to assign the first-order codes to pre-defined second-order themes (Weber et al., 2019); these themes represent control points previously discussed in the literature (Bohnsack et al. 2024).

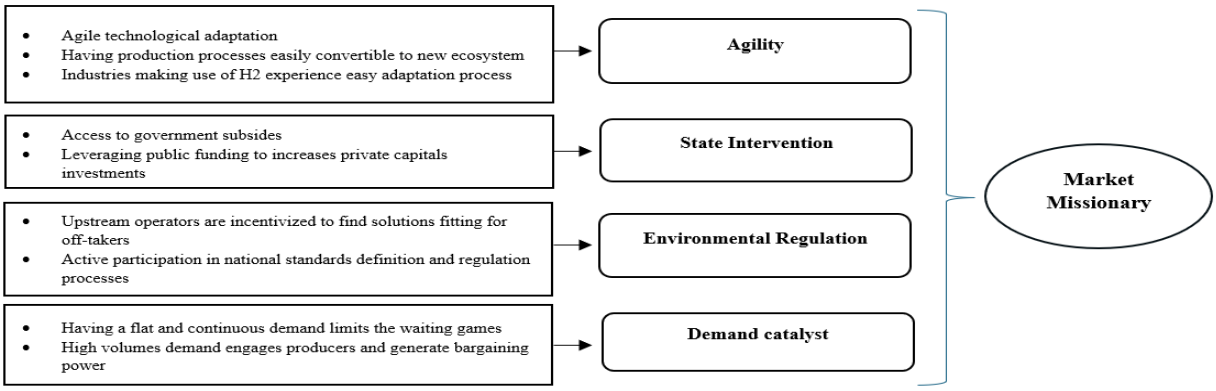
In a third step, the 12 second-order themes (control points) were aggregated into three overarching dimensions representing the market shaping roles: Market Drivers, Market Supporters, and Market Missionaries. This deduction was based on the characteristics of market shaping roles developed in prior studies (Flaig and Ottosson, 2022) and consistently aligned with previous role conceptualisations in the ecosystem and market strategy literature (e.g., Adner, 2017; Nenonen & Storbacka, 2020). ***Figure 2*** *represents the data structure that emerged from analysing control points within market shaping roles.*

Finally, based on interviews, the rich amount of secondary data, and in line with the distinctive characteristics of the market-shaping roles (Flaig and Ottosson, 2022; Adner, 2017), we associated the nine companies in our sample with three shaping roles: Market Driver, Supporter, and Missionary. To do this, we counted the number of first-order codes belonging to each individual firm that converge on each of the three shaping roles. This provided us with a comprehensive representation of the control points and the related market shaping role adopted by each company within our sample.

We then analysed the actions that each group of companies undertakes to establish and position control points within the market. Based on interpretive approach (Rynes and Gephart 2004) we identified recurring mechanisms adopted by each group of market-shaping roles. These mechanisms reflect the business, relational, or commercial initiatives developed by companies to take control of specific control points and exert influence over the emerging market. These mechanisms are infrastructural upgrade, branching-out, collaborative r&d programs, and sustainability-oriented symbiosis. This examination provided a deeper understanding of the systematic logic behind control point positioning across different shaping roles, highlighting the inherent differences and unique characteristics of each role.

Fig. 2: Analysis and data structure





Results.

- ***Control points underpinning market-shaping roles***

<u>*Market Drivers:*</u>

The role of the Market Driver is characterised by a targeted vision of the emerging ecosystem, as a result of this role, companies commit significant resources to develop the market, defining its boundaries, and engaging with multiple actors. Energy companies A and B, Gas distributor and Energy Hubs Developer are the four companies of our sample acting as market driver.

Companies approaching the emerging market with this role first position themselves in the market segments where they can create great value for the whole system. To this end, ***Specific Infrastructure*** *and* ***Scalability*** *are key control points for these companies, as they facilitate the scale-up of production and distribution. These companies are therefore investing in converting or adapting existing assets and resources, aimed at establishing a foundation for the emerging market.*

However, Market-Driver companies face great uncertainty regarding demand evolution, and it is essential for them to promote the harmonious growth of the entire system by securing the engagement of other actors and synchronizing their actions toward market creation (Fehrer et al., 2020; Kleinaltenkamp, et al., 2021). ***Orchestration*** *and, most importantly,* ***Network Engagement*** *are control points purposively developed to build market boundaries, develop demand, and capture future value by becoming the selling reference for other actors. Through these latest 2 control points these companies launch new initiatives across the value network, involving the participation of actors throughout the value chain, thereby creating the bones of the new market. By orchestrating projects and other companies' efforts, they seek to build a coherent value network that strengthens their bargaining power and enhances value capture.*

<u>*Market Supporters:*</u>

Market Supporters view market shaping as an opportunity to increase sales without significantly diverging from their core business. EPC contractors A, B, and C are technological providers responsible for the Engineering, Procurement, and Construction phases of a project and they are exploring the potential of this emerging market with this market shaping role.

This role suits market actors that are more cautious about the shaping process (Nenonen & Storbacka, 2020). They recognise that the new market can provide opportunities, but they take a more conservative approach. These firms therefore pursue activities that enable them to maintain flexibility and enable experimentation to improve their knowledge (Rindova and Courtney; 2018).

As for their contribution to the system value creation, they leverage control points, such as deep technological ***Know-How****, to develop* ***Unique Solutions****. These control points address the process constraints (Pinkse 2024) that companies transitioning to green hydrogen will have to face.*

*Our findings suggest that organisations that adopt this role proactively try to leverage their established name in the industry (****Brand****) and the direct interface with end-users (i.e.,* ***Customer Access****), by steering the process toward intangible control points. In fact, end-users embarking on transition paths are inclined to seek out well-known and experienced technology partners. Market Supporters are deeply intertwined with the industry sector. They therefore exploit these control pints to position themselves as the primary point of contact for new users in the emerging market. These companies thus establish their presence in the emerging market by conducting experimental projects with customers and by leveraging their brand as a symbol of reliability. This strategic use of control points is crucial for capturing value as the demand for new technologies grows.*

<u>*Market Missionaries:*</u>

The aim of Market Missionaries is to meet challenging environmental goals, with the emerging market serving as the means. Despite being in hard-to-abate sectors, the Steelworks Company and the Refinery Company are committed to reaching net-zero emissions by 2040 and they are approaching this market with a market missionary posture.

They support the envisioned market as far as their resources permit (Flaig & Ottosson 2022), given the significant technical and economic challenges they face (i.e., input, process, and output constraints). However, they play a key role in the market-shaping, as their ability to realize the vision of the new market often leads Market Drivers and Market Supporters' actions to converge on them (Flaig & Ottosson, 2022; Mountford, 2019).

To enter this market, these actors leverage their potential to generate a stable and consistent demand for hydrogen. This reduces the uncertainty for producers regarding the presence of off-takers, thereby mitigating the risk of waiting games (Robinson et al., 2012). We refer to this control point as the ***Demand Catalyst****. In addition, Market Missionaries capitalize on their ability to quickly adapt, making them highly attractive players for collaboration and exploratory projects (****Agility****). In an industrial context, this refers to a company's ability to adapt its production processes to the needs of the new market, while minimizing disruptions (Liljenberg 2022).*

Finally, it is important to stress that business objectives are deeply intertwined with environmental goals in shaping sustainable markets. Market Missionaries, experience the most significant benefits in emission reductions and can leverage this advantage. The generic control points determined at the institutional level, such as ***State Intervention*** *and* ***Environmental Regulation****, are exploited mainly by Market Missionaries. These companies are the first players entitled to apply for government grants and participate in regulatory discussions to address key constraints and systemic challenges in evolving regulations.*

The privileged position of Market Missionaries makes them an appealing partner for all the other players (particularly Marked Drivers) who are seeking deeper connections with policymakers to influence new developing regulations. This control point is leveraged by Market Missionaries to hook companies that seek to establish a voice at the institutional level and to forge new collaborative relationships that are instrumental in supporting their transition projects.

- ***Mechanisms of control point positioning in sustainability-oriented market***

This section examines the recurring mechanisms employed by different market shapers to position control points, highlighting the strategic actions undertaken and the distinct roles played by various actors.

Structural Upgrades *are mechanism that involves investments in essential infrastructure and assets to establish the foundational framework of the emerging market. By defining market boundaries that align with their organizational structure, firms create the necessary conditions for systemic value creation. This approach is predominantly adopted by Market Drivers, who integrate existing resources into the ecosystem to develop key infrastructures, such as renewable energy plants for hydrogen production or expanded distribution networks. Through these investments, they secure a strategic position that enhances market scalability and long-term competitiveness.*

Branching out *entails the creation of separate business divisions in different segments of the value network, rather than integrating core assets into the emerging market. This mechanism is commonly used by* ***Market Drivers*** *to ensure the balanced development of the entire value chain, mitigate supply bottlenecks, and secure future value capture. Companies engage in underdeveloped areas of the market to coordinate the participation of other stakeholders and promote ecosystem growth. For instance, firms may invest in hydrogen refueling stations or electrolyzer production to facilitate market formation. This dual-purpose strategy fosters both value creation and value capture by expanding market reach and ensuring readiness for future demand.*

Collaborative R&D Programs *are Primarily employed by* ***Market Supporters*** *and involve partnerships with industrial stakeholders to conduct research and test innovative solutions tailored to the emerging market. These initiatives serve as a means to acquire market knowledge, develop new technological competencies, and position firms as key suppliers for future clients. Although these programs often do not generate immediate financial returns, they allow firms to establish early-stage relationships with potential customers and gain credibility in the nascent market. For example, engineering and procurement contractors (EPCs) may provide consultancy for pilot projects in hydrogen mobility or industrial decarbonization, reinforcing their role as strategic partners in the transition process.*

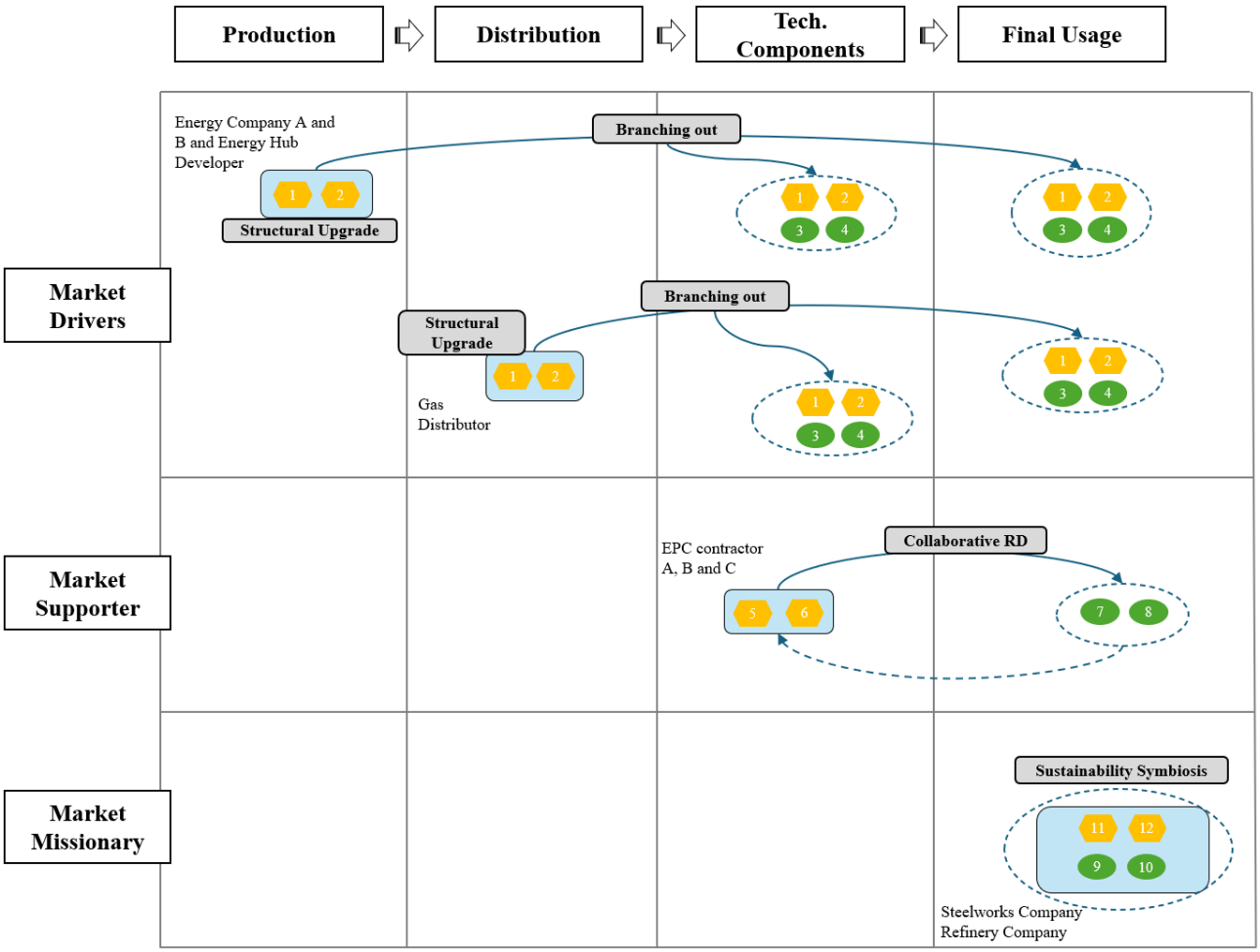
Sustainability Symbiosis *are employed by Market Missionaries, and foster interdependent collaborations between firms seeking to decarbonize their production processes and stakeholders capable of supplying low-carbon alternatives. Through these partnerships, firms share financial and operational resources to overcome transition barriers while securing stable demand for emerging technologies. Market Missionaries enhance the visibility of their projects, often positioning them as pioneering national or international initiatives, which in turn attracts external funding and partnerships. By leveraging their role as demand catalysts, they create favorable conditions for broader market engagement, strengthening their influence within the value network and becoming key partners for other market-shaping actors.*

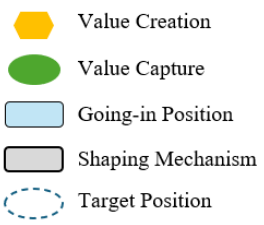
Figure 3 *presents a matrix that illustrates the dynamics of control point positioning across four key stages of the emerging market: production, distribution, technological development, and final use. This structure facilitates the*

identification of each player's entry point into the value network and the strategic pathway through which they position control points to capture value effectively.

Table 2 *shows the clear association between roles, mechanisms, control points, and, ultimately, the market constraints that hinder the development of new sustainable markets. These results highlight both the distinct contributions of various actors to market development and the specific positioning dynamics that foster value capture mechanisms and competitive equilibrium.*

Fig. 3: Market shaping mechanisms and the positioning of control points within the value network





Control Points	N
Specific Infrastructures	1
Scalability	2
Networking (i.e. collaboration)	3
Orchestration	4
Know-how	5
Unique Solutions	6
Brand	7
Customer Access	8
State intervention	9
Environmental Regulation	10
Agility	11
Demand catalyst	12

Tab. 2: Systematization of the intersection between the impact of control points on firm value dynamics and their role in overcoming market constraints

Market Shaping Role	Shaping Mechanisms	Control Points	Dynamic	Market constraints tackled
Market Driver	Infrastructural Upgrade	• Specific Infrastructure • Scalability	Value Creation	Limited availability of low-carbon substitute High production costs Lack of distribution system Harmonious growth of the whole value network
	Branching out	• Networking • Orchestration	Value Capture	
Market Supporter	Collaborative R&D	• Unique solution • Know-how	Value Creation	Need for new technological components Need for replacement of facilities
		• Brand • Customer Access	Value Capture	
Market Missionary	Sustainability Symbiosis	• Agility • Demand Catalyst	Value Creation	Uncertain demand and waiting games Higher output price point Lack of a clear regulation
		• Environmental Regulation • State intervention	Value Capture	

- ***Contribution***

This study highlights critical ecosystem points that are essential for the evolution of new value networks and the mechanisms of value capture-key conditions for firms to drive transition processes while maintaining competitive equilibrium.

Secondly, our study offers a more detailed understanding of the functioning and unique characteristics of various market-shaping roles in building sustainable markets. We identified the propensity of Market Drivers to operate across the entire value network, the cautious approach of Market Supporters focused on limited initiatives in value networks' layers further from their core business and the Market Missionaries' strategy, which entails a strong anchoring to the value network segments closest to their business domain. These findings build on the categories provided by Flaig and Ottosson (2022) to broad the different market-shaping roles in forming new sustainable markets.

In so doing our results contribute to the literature providing the disentanglement of the composite process of market shaping and thus fill the gap highlighted by recent research (Storbacka et al., 2022; Nenonen & Storbacka, 2021) on the limited applicability of the market-shaping literature within the sustainability context.

Research limitations. *Like any study, ours has its limitations. These include the qualitative nature of our findings, which are based on nine case studies. Future research should investigate the control points and positioning mechanisms in other sustainable emerging markets. Furthermore, our analysis did not address the roles of firms that resist or actively hinder change to preserve the status quo. Further studies could explore how such firms operate, the control points they leverage, and how their positioning strategies either interact with or oppose the market-shaping roles examined in this study.*

Managerial implications. *The implications of this study are useful to foster firms engagement into emerging sustainability-oriented ecosystem. Companies seeking to engage in market-shaping initiatives can leverage our framework to strategically evaluate resources, identify value-generating opportunities, and navigate control points to secure sustainable competitive advantage. By integrating the control points lens within sustainable market shaping, the framework offers a new perspective that encourages firms to explore market positions beyond their traditional core activities, and to thus reveal opportunities for substantial long-term value creation and capture.*

Originality of the paper. *To the best of our knowledge, this is one of the first studies to conduct an in-depth analysis of market shaping for sustainability, specifically by examining market shaping roles within sustainable markets. To this end, we integrate the control point perspective with the market shaping approach, leveraging their combined insights to better understand how companies position themselves and strategize to create and capture value. This study offers a*

promising framework for unraveling the complex processes that firms engaged in shaping sustainable markets must navigate to balance value creation and capture-that is, to foster sustainable ecosystems while profiting from it.

Key words: *Market Shaping; Control Point Perspective; Sustainable Markets; Environmental Business Strategy*

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Trusting Green Energy: How Social and Emotional Value Drive Peer-to-Peer Energy Adoption

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Abstract

Despite increasing interest in green energy, little is known about the factors that influence consumer adoption of peer-to-peer (P2P) green energy networks. These systems enable individuals to trade renewable energy directly, providing an alternative to traditional centralized energy providers. The advent of P2P energy networks marks a transformative shift in energy consumption paradigms, integrating green energy innovations into the daily lives of consumers. Despite their potential, the adoption rates of P2P energy systems are impeded by various consumer-based barriers, particularly trust and value perception. This study investigates the role of social and emotional value in shaping trust and adoption behavior in P2P energy trading. Two empirical studies examine how these perceived values impact consumer trust and adoption intentions. The findings suggest that social and emotional value significantly influence trust, which in turn mediates adoption decisions. This research contributes to the discourse on consumer behavior in energy markets, emphasizing the importance of psychological and social factors in fostering trust and sustainable energy adoption.

Framing of the research. *There are several business models under green energy innovation. This article focuses on peer-to-peer (P2P) energy provider (Benoit et al., 2017; Perren & Kozinets, 2018; Ruotsalainen, Karjalainen, Child, & Heinonen, 2017). P2P type exchange has gained popularity across various service sectors (Eckhardt et al., 2019). Such as transportation (e.g., Uber) to clothing (e.g., Rent the Runway) and short-term rentals (e.g., Airbnb). P2P activities are classified into; pure collaboration, where consumers interact without a digital platform (2) facilitated collaboration in the presence of intermediaries (C2C), and (3) mediated collaboration (Ertz et al., 2019; Benoit et al., 2017).*

P2P energy community differs from other forms of sharing, as it is classified into (1) coordinated market (e.g., Lüth et al., 2018; Papadaskalopoulos & Strbac, 2013), (2) decentralized market (e.g., Tushar et a., 2019), and (3) community market (Moret & Pinson, 2018). In a community market, the exchange is facilitated by a community manager (Esmat et al., 2021), whereas in a decentralized market, peers can directly communicate and interact with each other within "the connected community" (Esmat et al., 2021).

The growing interest in sustainable energy has led to innovative business models that decentralize energy markets, allowing individuals to trade renewable energy through peer-to-peer (P2P) platforms (Neves et al., 2020; Klein et al., 2020). The European Union has encouraged such initiatives through its Clean Energy for All Europeans directive (European Union, 2018), highlighting the potential of decentralized energy to enhance energy security and sustainability.

Despite the advantages of P2P energy networks, adoption rates remain low due to trust-related concerns (Jogunola et al., 2019). Trust is a crucial element in sharing economy models (Hawlitschek et al., 2018; Möhlmann, 2015), and in the energy sector, consumer hesitation is often linked to the lack of established regulatory frameworks and perceived risks associated with decentralized transactions (Hackbarth & Löbbe, 2020). While economic benefits are commonly cited as adoption drivers (Ecker et al., 2018; Li et al., 2021), recent studies suggest that social and emotional values may be equally or more important in influencing trust and adoption behavior (Bhowmik et al., 2018; Biswas & Roy, 2015).

This research addresses these gaps by examining how social and emotional value impact consumer trust in P2P energy trading and, consequently, adoption intentions. Research examining consumer adoption in the P2P innovation context still in an infancy stage. Therefore, broadens the literature on the psychological and social variables that predict trust and P2P energy adoption is worthwhile. Our theoretical framework is guided by the theory of consumption value, "green perceived value" (e.g., Khan & Mohsin, 2017) due to its applicability in the green energy consumption context (Sangroya & Nayak, 2017).

Purpose of the paper. *The primary aim of this research is to investigate the factors that drive consumer adoption of P2P green energy networks. Specifically, the study examines the extent to which social, emotional, and functional values influence consumer trust in P2P energy providers and how trust mediates adoption intentions. In doing so, this research*

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contributes to the literature on sustainable consumption and the collaborative economy by identifying the psychological mechanisms that underlie green energy adoption.

The importance of social value is widely regarded in green consumption context (Gilg et al., 2005), and renewable energy (Akella, Saini, & Sharma, 2009), sometimes it refers to social groups "family and friends" (Social influence-; Johnstone & Hooper, 2016) or self-image and social status (e.g., Yang, Lu, Zhu, & Su, 2015). However, some studies suggest that green energy's social value does not impact consumers' behavioural intentions (Sangroya & Nayak, 2017). Other studies noted that focusing on social value is relevant in green energy consumption (e.g., Arroyo & Carrete, 2019; Hartmann & Apaolaza-Ibáñez, 2012). as it provides social approval (Biswas & Roy, 2015; Tanner & Wölfing Kast, 2003), a sense of responsibility (Biswas & Roy, 2015), and improves the social status (e.g., Elliott, 2013).

Drawing from past research, there are several reasons why social value is relevant in the P2P energy context. First, prior work has shed substantial light on the benefits of social value in the P2P context. In particular "hospitality" (e.g., Lu, Cai, & King, 2020; Tussyadiah & Pesonen, 2016). Social value plays an important role in P2P markets (e.g., Bollinger & Gillingham, 2012; Chen, Ghosh, Liu, & Zhao, 2019). P2P business model allows individuals to create new forms of social connection "social value" (e.g., Perren & Kozinets, 2018). In P2P markets, there are situations in which sharing, and social interaction, such as sharing a ride, trading energy in the closer social context, can create a sense of communal belonging or communal norms (Huurne, Ronteltap, & Buskens, 2020).

In P2P context, social and community intrinsic motivations are viewed as an essential ingredient in this type of exchange (Botsman & Rogers, 2010). Prior work shows that social value is a major driver towards P2P adoption (Benoit et al., 2017). As it provides a stronger sense of community belonging (e.g., Minami, Ramos, & Bortoluzzo,2021), and has the the potential for creating and developing social connections with others (Tussyadiah & Penson, 2016). Therefore, this work theorizes that social value plays a vital role in improving consumers' trust and adoptions towards P2P energy networks. This idea supports the interpersonal relationship literature (Chiu, Huang, & Yen, 2010) and social exchange theory (Mitchell, Cropanzano, & Quisenberry, 2012). Consumers gain several benefits from social interaction (Stollery & Jun, 2017), engaging in P2P activities enables connections to foster social connection and establish relationships (Tussyadiah & Pesonen, 2016; Davlembayeva et al., 2020; Tussyadiah, 2016), increase social ties (Davlembayeva et al., 2020), which ultimately build trust (Lu et al., 2020). Following this rationale, it is suggested that social value impact consumers' trust and adoption.

Emotional value refers to the capacity to arouse curiosity, provide novelty, and satisfy a desire for knowledge (Sheth, Newman, & Gross, 1991). Prior knowledge suggests that emotional value is the product's ability to elicits feelings or affective states (Sheth et al., 1991). Emotional value plays a vital role in consumers buying green products (Khan & Mohsin, 2017); indeed, some studies suggest that consumers are emotionally attached to green products (e.g., Koller et al., 2016). For example, Chang (2011) found that consumers felt greater about themselves when they bought green products (Chang, 2011) because such actions provide a sense of social responsibility (e.g., "fighting climate change" Odou & Schill, 2020), or "feeling is for doing" (e.g., Zeelenberg, Nelissen, Breugelmans, & Pieters, 2008; Odou & Schill, 2020). For example, recent work by Odou and Schill (2020) that anticipated emotions affect behavioural intentions to fight climate change. Emotional value has received recent attention in the P2P literature (e.g., Zhang & Jahromi, 2019). P2P activities enable both peers to develop stronger social bonds (Tussyadiah & Pesonen, 2016), emotional value (Zhang & Jahromi, 2019). However, most studies were discussed outside the energy domain. Thus far, this literature demonstrates that emotional values drive repurchasing decisions (Zhang & Jahromi, 2019). Furthermore, climate change research suggests that strengthening the emotional rewards by increasing the intensity of positive emotions-related content in the message can positively affect prosocial behaviour in the fight against global warming (Odou & Schill, 2020).

Extending the paradigm into a P2P energy network, it is declared that emotional value is relevant in predicting adoption behaviour. This perspective is aligned with recent studies that associate emotional benefits and consumer acceptance of new technologies (e.g., Kim, Oh, Park, & Joo, 2018; Li et al., 2017). For example, Li et al. (2017) found the emotional experiences such as joy or pleasure of new technologies impact consumers' adoption of battery electric vehicles. Following this reasoning, it is expected that in P2P energy trading, emotional value plays an essential role in establishing trust and adoption.

Finally, prior studies have highlighted the importance of trust in P2P platforms such as Airbnb and Uber, where decentralized exchange structures necessitate confidence in service providers (Ert et al., 2016; Möhlmann, 2015). In the case of P2P energy trading, where transactions involve essential resources and high perceived risk, trust may play an even greater role in shaping consumer behavior (Hackbarth & Löbbe, 2020). This research builds on existing work by applying the concept of green perceived value (Sangroya & Jogendra, 2017) to the energy-sharing context, examining its influence on trust and adoption behavior.

Methodology. *This research comprises two empirical studies designed to test the proposed framework. Study 1 shows that consumers exhibit a lower level of trust towards P2P (vs company) energy providers. Study 2 tests the full model using PLS-SEM to test and reveal that emotional and social value are the most critical factors in predicting consumers' trust and adoption intentions.*

Study 1 - Trust in the P2P energy context

This experiment was explicitly designed to examine whether consumers exhibit higher trust in P2P (vs conventional) energy providers. To do so, a scenario-based experiment is used to test this prediction. The study provides preliminary evidence on consumers' trust in P2P energy systems.

Eighty European consumers were recruited via Prolific online panel (48% females, Mage = 35.34 SD = 12.88) to exchange for a nominal payment. Participants were randomly assigned to a peer energy provider (N =39) or an energy company (N = 41). Ten participants were excluded from the analysis as they failed the attention checks. The final sample size was (N=70).

Participants were instructed to read a scenario: "Imagine that you are looking for a new energy provider, and you came across this post about a new energy provider: Marin P2P Energy. "P2P energy is a new concept of buying and selling between individuals. They can produce clean energy and sell at a reasonable price. For example, using Marine service, you can buy energy from your neighbour (solar panels)". [Marine is a new energy company that provides clean energy. It sells energy at a reasonable price. Using Marine energy service, you can buy energy from the company's power station (solar energy)]. Then, the participants answer to our key measures.

On a nine-point Likert scale of 1(strongly disagree) and nine (strongly agree), it is measured trust using the items of study 1 (α =.80). For manipulation checks, it is asked participants to identify if "the energy was provider by peer service provider", "by a company", it was a national energy supplier or a peer".

The manipulations worked as intended. In the peer energy provider condition, respondents indicated that a peer provider provided the service rather than a company (Mpeer =5.85 vs Mcompanu =3.31; t(68) =1.98, p < .05). Further, participants perceived the company as a national energy distributor (Mpeer =4.48 vs Unconventional = 5.71; t(68) =1.98, p < .03).

Study 2 - Testing the full Model

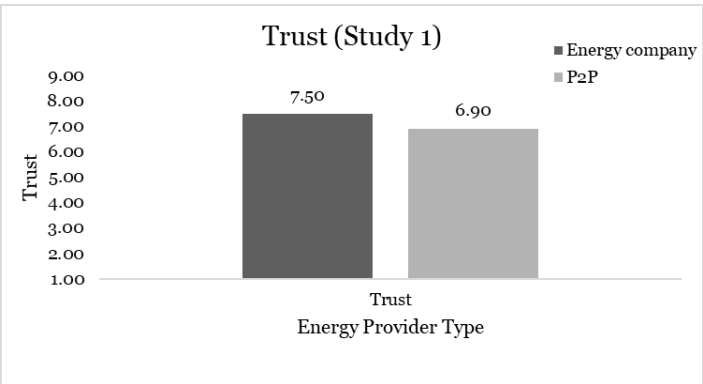
Two hundred and forty US energy consumers were recruited via online panel Amazon Mechanical Turk (MTurk) in exchange for a nominal payment. MTurk is a valuable source for data analysis and has been widely used in behavioural and social science research, and is considered a good source for data collection (e.g., Raimi & Carrico, 2015; Schwartz et al., 2015). Ten participants were excluded from the analysis for failing attention checks, which resulted in our final sample of 230 participants (Females = 42.7%, Mage = 34.33, SD = 12.3).

First, participants were asked to read the scenario regarding peer-to-peer energy systems based on peer-to-peer energy exchange. Then, participants responded to our measures on a scale from 1(strongly disagree) to 9 (strongly agree); social value was measured by adapting items from Sangroya and Nayak (2017), i.e., "Using green peer-to-peer energy network would help me to feel accepted by others", "improve the way I am perceived by others" (α = .94), and four items for functional value by adapting α = .88). Behavioural intentions towards P2P energy were detected by using three items from Washizu et al. (2019) ("I plan to use peer to peer energy network, intend to use peer-to-peer services, "I intend to use peer-to-peer energy network" and "I predict that I will use peer-to-peer services as long as I have access to It" α = .93). Additionally, trust was evaluated by adopting five items from Chai et al. (2012) and Bhattacherjee (2002), e.g., "The other users of peer-to-peer energy network are truthful in dealing with one another " α = .92). See Appendix 1 for all measurement items.

The research hypotheses are tested by employing Partial Least Squares Structural Equations Modelling (PLS-SEM), using SMART-PLS 3 (Ringle, Wende, & Becker, 2015). This statistical technique estimates causative relations by combining statistical data and qualitative causal hypotheses (Dijkstra & Henseler, 2015). For this analysis, the partial least squares have been adopted - a variance-based technique - because it does not require a large sample and has no restriction on a normal distribution.

Results. *In Study 1, participants reported significantly higher levels of trust towards traditional energy companies (M = 7.53, SD =1.64) as opposed to the peer providers (M = 6.85, SD = 1.27; t(68) = 2.460, p < .001). Thus, Study 1 shows that participants hold more trust concerns towards this type of green energy innovation.*

Tab. 1: Trust based on the provider



It is shown that consumer trust is a crucial barrier towards P2P adoption. When faced with two types of energy providers, participants reported higher trust towards conventional (vs P2P) companies.

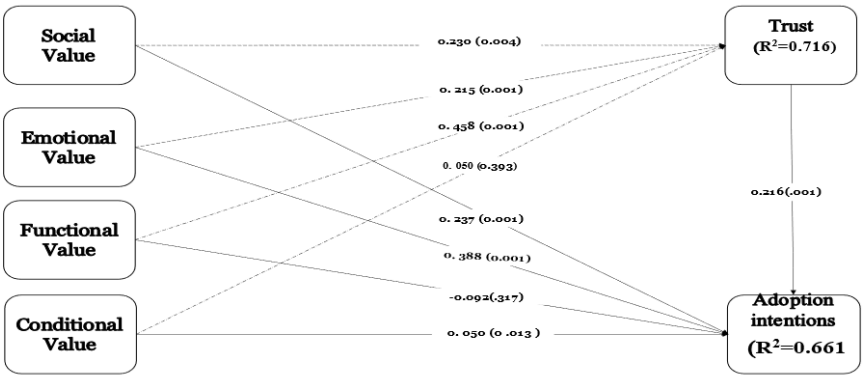
In Study 2, the research hypotheses are tested by employing Partial Least Squares Structural Equations Modelling (PLS-SEM), using SMART-PLS 3 (Ringle, Wende, & Becker, 2015). The data analysis is executed by adopting a two-step development. First, the measurement model is examined to ensure the research instrument's reliability and validity, and then the structural model is analyzed to test the hypotheses.

The measurement model was assessed for convergent and discriminant validity and construct indicator reliability (Hair, Hult, Ringle, and Sarstedt, 2016). The internal consistency values (Cronbach's Alpha) and the Composite Reliability values are adequately and are considered fitting in exploratory studies (Hair et al., 2014), as well as all the AVEs are more significant than 0.5 (Fornell & Larcker, 1981).

The structural model results were assessed through path coefficients (β), applying a bootstrapping technique with 1,000 iterations to calculate the t-statistic and the strength of the relationships among all constructs.

Our research model supports H1, and the social value positively impacts adoption intentions (β=-.237, p<0.01). Thus, H1a has been accepted, and social value has a positive impact on trust (β=-.230, p<0.01), confirming (H2b) and emotional value impacts consumers' adoption of the P2P energy system (β=.388, p<0.01), accepting H2a(β=.237, p<0.01). To test H3b, it has been found a significant effect of functional value on trust (β=.458, p<0.01), however, there was not a significant effect of functional value on adoption intentions (β=-0.092, p=.340), thus rejecting (H3a) and accepting (H3b). Finally, it was not revealed a significant impact of conditional value on trust (β=0. 50, p=.391) or consumers' adoption intentions' (β=0.050, p<0.013).

Tab. 2: Research model results



Thus, Study 2 reveals that the social and emotional dimensions of the green perceived model are the most important predictor in the P2P energy trust and adoption. More specifically, they both play a vital role in influencing adoption. However, functional value does not influence adoption.

Research limitations. *This research has limitations that may be future research opportunities. All our studies using survey and scenario-based experiments will need future research examining actual customer data to collaborate our findings. Moreover, The P2P green energy system is in early phases; thus, we lack clarity over boundaries of the concept of collaborative green energy (Biresselioglu et al., 2018). Future research could improve the original conceptual model provided, using other variables such as economic factors and social interaction.*

Our model focused on four dimensions of green perceived value, and future studies need to explore the role of epistemic and environmental dimensions (e.g., Biswas & Roy, 2015). Furthermore, one of the critical issues that might affect trust in P2P energy is privacy concerns. Growing privacy concerns associated with the consumers' data. Therefore, future research needs to explore consumers' privacy concerns in the P2P energy context.

Finally, this study focuses mainly on trust and adoption. However, other psychological and social factors might affect consumers' responses to energy communities, i.e., relationship norms communal and exchange (e.g., Aggarwal, 2004), or money and social market (see- Heyman & Ariely, 2004), thus understanding these communal and exchange norms might affect consumers' reactions to P2P platforms and providers.

Managerial implications. *First, given the strong influence of social and emotional value on trust and adoption, P2P energy platforms should emphasize community-building and shared environmental responsibility in their marketing strategies. Our findings can help both P2P platforms and peer single providers find practical strategies that impact consumers' adoption as our findings suggest that social value is the critical predictor towards adoption (e.g., Kowalska-Pyzalska, 2018). Thus, focusing on social aspects can be effective for P2P energy providers. Indeed, many emerging peer platforms seem to have a social focus in their positioning and branding strategies. Therefore, we encourage P2P energy platforms to focus on social value. This is beneficial for increasing adoption and plays an essential role in establishing trust in P2P platforms (e.g., Lu et al., 2020).*

Second, platform developers should implement trust-enhancing mechanisms, such as transparent user reviews, certification systems, and secure transaction processes, to address consumer concerns about reliability and risk. Previous

research suggests that trust-building features can significantly impact engagement in sharing economy platforms (Ter Huurne et al., 2017).

Third, policymakers should support regulatory frameworks that facilitate trust in P2P energy trading. Standardizing consumer protection measures and providing financial incentives for early adopters may accelerate adoption and contribute to broader sustainability goals.

Originality of the paper. *This research makes a novel contribution by integrating the concept of green perceived value with the study of trust and adoption in P2P energy trading. Unlike previous work that focuses on functional and economic factors, this study highlights the primacy of social and emotional drivers in shaping consumer behavior. By demonstrating the mediating role of trust, the findings extend the theoretical understanding of P2P energy adoption and offer practical guidance for promoting decentralized energy exchange.*

Key words: *Green energy adoption, social value, emotional value, peer-to-peer energy, sustainability.*

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On a mission to get funds: the demand for venture capital of impact oriented ventures

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Abstract

This working paper examines the demand side of impact oriented ventures' financing for two key sources of equity: Traditional (TVC) and Social Impact Venture Capital (SIVC). Because of their dual mission to generate social or environmental impact alongside financial returns, we posit that impact-oriented ventures have stronger need for external financing. However, they might refrain to associate with investors who do not share their intention to generate impact, such as TVC, fearing mission drift. Instead, that impact-oriented ventures might prefer investors who also share impact objectives, such as SIVC. To test our hypotheses, we conduct a survey on European start-ups, collecting valid responses from 946 ventures—35.1% of which are impact oriented. Preliminary results indicate that impact oriented ventures exhibit higher overall needs for external finance compared to their commercial counterparts, and they have a strong preference for SIVC rather than TVC financing. Our results shed new light on the results of previous studies that found that impact-oriented ventures are less likely to secure TVC: it is not only because of a lower attractivity of these companies towards TVCs, but also because of a lower demand.

Framing of the research. *The objective of creating social or environmental impact, often aligning with the achievement of the United Nation Sustainable Development Goals (SDGs), has become increasingly relevant for many entrepreneurial ventures, especially in Europe (Austin et al., 2006; Battilana & Lee, 2014). Until recently, social or environmental impact-driven missions were typically the domain of non-profit activities, which mostly rely on donor communities to finance their operations (Shepherd et al., 2019; Schätzlein et al., 2023; Bonfanti et al., 2024). Impact oriented ventures are instead for-profit businesses, with a mission of generating social or environmental impact alongside financial returns. Impact oriented ventures have distinctive entrepreneurial practices, also with respect to the collection of financial resources (Battilana & Lee, 2014; Doherty et al., 2014). While philanthropic finance continues to be relevant (Lall & Park, 2022), it is not sufficient to ensure the scale-up of the venture. The objective of this paper is to investigate the demand for external finance of impact oriented ventures, with as focus on different types of Venture Capital (VC) funds.*

Impact oriented ventures, operating at the intersection of social and commercial objectives, have unique financial needs that are often overlooked (Doherty et al., 2014). Traditional VC (TVC), which is fundamental source of finance for promising entrepreneurial ventures, are often reluctant to associate with impact oriented ventures because of their impact goals, which might be perceived by TVCs as potentially compromising financial performance. Impact oriented ventures require hybrid financial instruments that align with their dual objectives, and specialized social investment funds and programs have emerged to fill this gap (Hehenberger et al., 2019). Literature shows that these companies are more likely to get funding from niche VC investors, including social impact venture capital (SIVC) funds (Lo Mele et al., 2024).

Yet, existing literature has mostly focused on the supply side of the financing of impact oriented ventures (Barber et al., 2021; Lo Mele et al., 2024), taking the point of view of investors, rather than the ventures themselves. The nuanced demand for finance of impact ventures, in terms of their preferences and access barriers, remain underexplored, highlighting a critical area for research and policy development (for an exception related to repayable finance, see Lyon & Owen, 2019).

Purpose of the paper. *To fill this gap, in this paper we focus on impact oriented needs for external equity, and on the demand for two prominent providers of entrepreneurial finance: TVCs and SIVCs. We theorize that, given their focus on creating impact alongside profit, impact oriented ventures may require larger and more patient capital, perceiving a greater need for external equity compared to other ventures. At the same time, the agency costs associated with engaging with external investors may make companies reluctant to seek funds from TVCs, fearing that the investors might not perceive, value or protect their impact orientation. Concerned of being forced to drift away from their mission when*

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associating with TVCs, impact oriented ventures might seek funds from SIVCs, who also value and prioritize social and environmental impact.

Furthermore, we tackle the heterogeneity of impact oriented ventures, distinguishing those with a more substantial impact orientation (Truong et al., 2021). Specifically, we expect that ventures that adopt more sustainable managerial practices and those with a stronger intention to scale-up their impact will be more in need of external finance because of the higher investments needed to pursue their mission. At the same time, they will also perceive a stronger risk of mission drift (Battilana et al., 2022), which will further reduce the demand for TVC financing and increase the demand for SIVC.

We test our hypotheses using survey-based data retrieved in early 2024 from a European sample of start-ups, 35.1% of which are impact oriented. Results confirm our hypotheses that these ventures have higher needs for finance. Conditional on needing resources, impact oriented venture are less likely than other ventures to seek TVC, and more likely to seek SIVC. These results partially explain the evidence on a less likely association between impact oriented ventures and TVC, demonstrating that it is not only an issue of supply of finance, but also a consequence of the impact oriented ventures reluctance to associate with TVCs, for fear that the investor might require a mission drift.

Literature review and hypothesis development:

Financial need refers to the gap between a venture's available internal resources (such as cash flow, retained earnings, or founder contributions) and the capital required to sustain and expand its operations, fulfil strategic objectives, and achieve long-term viability (Patzelt et al., 2008; Bottazzi et al., 2014). Entrepreneurs typically address these financial needs by seeking external sources of financing. Importantly, the degree of financial need can influence entrepreneurial decision-making, not only with respect to financial strategies but also regarding non-financial, value-adding decisions (Riepe & Uhl, 2020).

While prior research has explored the general financing challenges faced by new ventures, direct studies on the specific financial needs of impact oriented ventures remain scarce. In this research, we posit that impact oriented ventures require more capital than their purely commercial counterparts. For commercial ventures, external financing is primarily used to pursue essential business activities, such as establishing the company, developing products, and scaling operations (Plambeck, 2012; Villanueva et al., 2012). In contrast, impact oriented ventures require funding for a dual purpose: in addition to covering core operational needs, external resources are crucial to creating positive social or environmental impact (Austin et al., 2006). This dual-purpose mission often translates into the adoption of less profit-oriented business models or the implementation of additional mission-driven activities (Hietschold et al., 2023), both of which heighten their financial needs.

Impact oriented ventures frequently adopt business models that, particularly in their early stages, are less profitable or less efficient than those of commercial ventures. For example, ventures targeting lower-income communities may offer products or services at reduced prices to ensure accessibility (Bloom, 2009). While such strategies, commonly aimed at bottom-of-the-pyramid populations, may yield long-term benefits through high sales volumes (Dentchev et al., 2022), they often result in reduced margins during initial phases. Similarly, firms employing socially disadvantaged workers might prioritize social impact over operational efficiency, further increasing their reliance on external financial resources (Narayanan & Terris, 2020). These factors collectively heighten the financial needs of such ventures.

Beyond business model constraints, impact oriented ventures frequently invest in mission-aligned activities that add substantial operational costs. For instance, ventures working directly with beneficiaries often provide additional training, education, or employment programs to fulfil their social missions (Hietschold et al., 2023). In addition to direct beneficiary engagement, these organizations often undertake activities aimed at other stakeholders, such as customers or industry peers. Environmental entrepreneurs, for example, may simultaneously reduce environmental degradation and capture economic value by educating consumers about the environmental attributes of their products or services (Dean & McMullen, 2007).

Recent research has also highlighted advocacy as a critical activity for social enterprises (Mair & Rathert, 2024) a specific type of impact oriented venture. Advocacy efforts are designed to address systemic social problems by influencing public policy, legislation, norms, attitudes, and behaviors. Unlike lobbying, which primarily seeks to advance the interests of specific groups or organizations, advocacy aligns with the broader missions of these ventures, aiming to tackle the root causes of societal issues. However, while advocacy is mission-aligned, it often lacks a direct positive impact on profitability. Consequently, these initiatives generate additional costs, further exacerbating the financial constraints faced by impact oriented ventures.

Taken together these arguments suggest that impact oriented ventures may face heightened financial constraints, making them more dependent on external funding. Therefore, we hypothesize:

Hypothesis 1: Impact oriented ventures are more likely to need external funding.

VC is a prominent provider of finance for entrepreneurial ventures, better able to cope with severe information opacity and lack of collateral than traditional commercial banks (Kaplan & Strömberg, 2001; Carpenter & Petersen, 2002). Yet not all companies are likely to seek this specific financing opportunity. Previous literature shows that the ventures' demand for external equity depends on a number of factors, including the availability of internal sources of finance such as cash flows (Mina et al., (2013), the growth orientation of the company (Cosh et al., 2009; Eckhardt et al., 2006; Mina et al., 2013; Riding et al., 2012), the industry (Eckhardt et al., 2006; Cosh et al., 2006) the level of education and experience of the founders (Bertoni et al., 2017; Colombo et al., 2017; Cosh et al., 2009) and the local availability of VC (Colombo et al., 2019).

Recent advancements in the supply side of VC financing have emphasized the heterogeneity within the VC ecosystem, which alongside Traditional VC includes, among others, Social Impact (SIVC), Governmental, and Corporate VC (Lo Mele et al., 2024). These diverse investor profiles exhibit distinct preferences and investment strategies (Cole et al. 2022; Shankar et al., 2024), leading to significant variation in the characteristics of the ventures they include in their portfolios. Importantly, the process of venture selection is not unidirectional; it represents a mutual matching process between investors and investees (Bengtsson & Hsu, 2015). This dynamic suggests that the preferences of the investees themselves—shaped by the attributes of potential investors—play a crucial role in determining the outcomes of VC engagement.

Building on this premise, we argue that the demand for VC financing among impact oriented ventures will vary based on the type of VC considered. Specifically, we posit that impact oriented ventures are more likely to prefer SIVCs while avoiding TVCs. Our argument is based on the perceived tradeoff faced by impact entrepreneurs when seeking external funding. While the inclusion of new shareholders offers the opportunity to secure additional capital, it also introduces the risk of mission drift: external investors may pressure the venture to alter its business model to achieve greater profitability (Gerasymenko et al., 2015), and in the case of impact oriented ventures this might come at the expense of the venture's social or environmental mission (Cetindamar & Ozkazanc-Pan, 2017). Such perceived risks can significantly influence the decision-making process of impact oriented entrepreneurs, who prioritize maintaining their mission integrity.

The perceived risk of mission drift, however, is not uniform across investor types. When engaging with TVC, these tensions are likely to be heightened due to the fundamental misalignment between the profit-maximization objectives of TVC and the dual-purpose mission of impact oriented ventures (Shatzlain et al., 2022). This misalignment exacerbates principal-agent costs and increases the likelihood of conflicts arising from differing strategic priorities. Consequently, impact oriented ventures may actively avoid seeking funding from TVC to mitigate these risks. Conversely, these perceived risks are significantly lower when dealing with SIVC. Impact investors and impact oriented ventures share a dual mission to achieve both financial returns and measurable social or environmental outcomes (Cetindamar & Ozkazanc-Pan, 2017). Moreover, SIVC management teams often have professional backgrounds in NGOs, social enterprises, or other mission-driven organizations (Scarlata et al., 2017), fostering a shared understanding of impact oriented goals. This alignment in objectives and values helps establish a common "impact language, " reduces the potential for conflict, and enhances trust. As a result, SIVC are seen as more supportive of maintaining the venture's mission while providing the necessary financial resources. Based on these arguments, we hypothesize:

Hypothesis 2: Impact oriented ventures are less likely to search TVC (a) and more likely to search SIVC (b) than other ventures

While we have acknowledged the heterogeneity of investor types, we have so far considered impact oriented ventures as a homogenous group. However, prior literature underscores the significant diversity among such ventures in terms of their characteristics, objectives, and capabilities (Saebi et al., 2019).

One important source of heterogeneity lies in the extent to which these ventures adopt managerial practices aimed at setting, monitoring, integrating, and communicating impact goals (Rawhouser et al., 2019). For some ventures, adopting these practices comprehensively is perceived as disruptive due to ambiguous indicators or the complexity and time-intensive nature of their application (Schlütter et al., 2024). This challenge is partly due to the absence of standardized measurement approaches and partly to the perception that these activities represent an additional burden for organizations. As a result, some ventures prefer more immediate and intuitive ways of communicating results, such as storytelling or qualitative evaluations of social criteria (Hehenberger et al., 2019).

We posit that this heterogeneity in the adoption of sustainability-related managerial practices influences not only the financial needs of these ventures but also their preferences for specific types of investors. Ventures that implement these practices comprehensively are likely to incur higher financial burdens because such processes often require significant internal resources, including specialized personnel, dedicated time, and the development of systems for data collection, analysis, and reporting (Truong et al., 2021). These costs add to the overall operational expenses of the venture, heightening its financial constraints and increasing its reliance on external funding sources. Therefore, we hypothesize:

Hypothesis 3: Impact oriented ventures that incorporate managerial practices related to their impact mission are more likely to need external funding.

Furthermore, the degree of adoption of these practices has implications for the ventures' preferences regarding investors. Ventures with robust managerial practices are more likely to prioritize consistency with their mission, which increases their sensitivity to potential misalignments with investors. The process of systematically defining, monitoring, and communicating impact goals reinforces a venture's commitment to its mission (Ebrahim et al, 2014) and amplifies the perceived risks of engaging with investors who prioritize financial returns over social or environmental outcomes. For such ventures, the possibility of mission drift—where external pressures lead to a deviation from core impact objectives—becomes a significant deterrent to approaching non-aligned investors, such as TVC.

Conversely, these ventures are more inclined to engage with SIVC, whose dual-purpose objectives align with their own commitment to achieving both financial and impact outcomes (Lo Mele et al, 2024). The shared values and understanding between ventures and SIVC foster trust and reduce potential conflicts, making SIVC a preferred financing option for ventures with strong sustainability-related managerial practices. Additionally, ventures that adopt these

practices are often growth-oriented and seek to scale their impact in a way that aligns with their mission, further discouraging engagement with investors whose priorities diverge from their own (Schätzlein et al., 2023).

Hypothesis 4: Impact oriented ventures that incorporate managerial practices related to their impact mission are less likely to seek TVC and more likely to seek SIVC compared to other impact oriented ventures

Methodology.

Data on the need or demand for external finance of ventures is generally not available from proprietary databases. We therefore decided to collect information on the demand for external finance of European impact oriented and commercial ventures through a survey. We designed the survey in Spring 2023, based on academic literature and on previous relevant surveys, and submitted to companies retrieved from Dealroom in July 2023. The list of ventures was supplemented by Innovative start-ups registered in the special section of the Italian Chambers of Commerce registry[5].

After data cleaning, the final list of prospective survey recipients included 102, 931 European ventures founded since 2015. The official survey was first distributed on the 6th of February 2024 in 7 languages. Four reminders followed till the end of March. Only a portion (53, 776) of our emails was successfully received[6] and opened by recipients. Eventually, 1, 583 responses were collected, for a response rate of 2.94%[7]. Response rates greatly varied across countries. Moreover, older companies were less likely to participate in our survey: the response rate is as high as 64% for companies born in 2023 and as low as 2% for companies founded in 2015. The average age of ventures in 2023 was 4.54 years.

In our models, we use 946 answers for which we have full information on variables of interest. In order to avoid sample selection bias to influence our results, we adopted post-stratification techniques based on stratified weights (Cochran, 1977; Deville et al., 1993). and used those weights to run weighted regressions.

Our model specifications analyse the need and the search for VC funding of our respondents. We first asked our ventures whether they ever searched VC, defining a dummy variable need as equal to 0 if the companies didn't search because of a lack of need, and 1 in all other cases. 836 (88.4%) out of 946 companies, perceived the need for external financing. Companies that had sought VC were then asked to indicate the type of investor they first approached during their lifetime, namely TVC, SIVC.

The main independent variable captures whether a venture is impact oriented. We considered as impact oriented ventures who declared that impact orientation is the venture's top priority or among the top priorities, excluding those companies whose impact orientation has changed over time. Eventually, we consider as impact ventures 332 companies (35, 1% of total). To identify "substantial" impact oriented ventures, we asked respondents to indicate whether they adopted any sustainable managerial practices among 12 different practices provided. We use this information to build two alternative variables capturing the use of sustainable managerial practices: Sustainable practices count and Sustainable practices factor (obtained through a factor analysis). (See Table 1 for statistics and correlation matrix)

Table 1: Descriptive statistics and correlation matrix.

		N	Mean	SD	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	Need	946	0.884	0.321	0.000	1.000	1.000							
(2)	Impact Venture	946	0.351	0.478	0.000	1.000	0.087	1.000						
(3)	Search of TVC	946	0.391	0.488	0.000	1.000	0.291	0.001	1.000					
(4)	Search of SIVC	946	0.146	0.353	0.000	1.000	0.150	0.198	0.086	1.000				
(5)	Age	946	4.542	2.074	0.000	8.000	-0.052	-0.126	-0.070	-0.068	1.000			
(6)	Growth Intention	946	3.962	1.213	1.000	5.000	0.087	0.034	0.172	0.043	-0.118	1.000		
(7)	Sustainable Practices count	946	2.149	3.610	0.000	12.000	0.068	0.810	-0.036	0.209	-0.114	0.042	1.000	
(8)	Sustainable Practices Factor	946	.000	.504	1.945	.646	0.014	.000	0.008	.054	0.003	.075	.401	.000

Notes. This table presents the descriptive statistics and correlation matrix of the variables used in the analysis.

We use probit regressions to test the hypotheses H1 and H3, using need as dependent variable (Table 2). We then restrict the analysis to companies in need for external finance and resort to bivariate probit regressions to test hypotheses H2 and H4, on the search for TVC and SIVC, respectively (Table 3). We also control for growth intention, foundation year, industry sector thanks to the NACE codes, and the country where the venture is located.

Results. *Our results related to hypotheses 1 and 3 are reported in Table 2. Considering the dichotomous nature of the dependent variable need, we employed a Probit model with robust standard errors and probability weights to integrate post-stratification techniques and limit sample selection bias.*

Column I shows some support to hypothesis 1, showing a stronger need of external finance for impact oriented ventures (p-value<10%). However, neither of our measures capturing the adoption of sustainable managerial practices in Columns II and III are significant. They do not influence the financial need of impact ventures, thus rejecting hypothesis 3. Instead, the need for finance is mostly driven by the ventures growth intention (p-value<5%).

5 https://startup.registroimprese.it/isin/static/startup/index.html?slideJump=32

6 For GDPR compliance we decided to use generic company email (info@company.com) for the distribution.

7 The low response rate is arguably the outcome of different circumstances: use of generic email addresses, the survey distributor service, recipients' language.

Table 2: Probit models on the need of external finance for impact ventures and further explored for impact ventures adopting sustainable practices.

Dependent variable: Need	I	II	III
Impact Venture	0.292*	0.400	0.341*
	(0.171)	(0.258)	(0.154)
Growth Intention	0.128**	0.128**	0.133**
	(0.064)	(0.064)	(0.065)
Sustainable Practices Count		-0.016	
		(0.035)	
Sustainable Practices Factor			-0.216
			(0.174)
Constant	1.201*	1.184	1.143
	(0.728)	(0.733)	(0.733)
Country, Industry, Foundation year dummies	Yes	Yes	Yes
N	946	946	946
chi2	4614.198	4604.341	4547.268
ll	-0.099	-0.099	-0.098
r2_p	0.193	0.193	0.196

Notes. Significance: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Results on the search for TVC and SIVC are shown in Table 3. In column I, we find that impact ventures are less likely to seek TVC (p-value<5%) and more likely to seek SIVC (p-value<1%), consistently with our Hypothesis 2.

In Column II, we find that this effect is further amplified when these ventures adopted more sustainable managerial practices, as Sustainable Managerial practices score has a significant negative effect on TVC (p-value<10%) and positive on SIVC (p-value <5%). This supports hypothesis 4.

In Column III, when we use our alternative measure of Sustainable Practices Score, we do not find a significant effect on the search for TVC, but we find a strong positive effect on the search for SIVC (p-value<5%), further supporting Hypothesis 4.

Moreover, growth orientation loads positively on the chances to look for TVC (p-value <1%), while it has no effect on the search for SIVC.

Table 3: *Biprobit models on the search of TVC and SIVC by impact ventures, and further explored for impact ventures adopting sustainable practices.*

Biprobit	I	II	III
Searched TVC			
Impact ventures	-0.286**	0.041	-0.292**
	(0.143)	(0.236)	(0.142)
Growth Intention	0.176***	0.185***	0.173***
	(0.061)	(0.061)	(0.061)
Sustainable Practices Count		-0.052*	
		(0.031)	
Sustainable Practices Factor			0.052
			(0.131)
Constant	-0.541	-0.660	-0.520
	(0.578)	(0.577)	(0.580)
Searched SIVC			
Impact ventures	0.567***	0.126	0.507***
	(0.149)	(0.248)	(0.144)
Growth Intention	-0.079	-0.089	-0.106
	(0.071)	(0.071)	(0.071)
Sustainable Practices Count		0.065**	
		(0.033)	
Sustainable Practices Factor			0.339**
			(0.138)
Constant	-0.953	-0.815	-0.783
	(0.621)	(0.614)	(0.615)
Rho	0.075	0.086	0.077
	(0.095)	(0.095)	(0.095)
Country, Industry, Foundation year dummies	Yes	Yes	Yes
N	836	836	836
chi2	.	.	
p	.	.	
ll	-0.316	-0.3135	-0.3138

Notes. Significance: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Research limitations. *The major limitations of our study lie in four key aspects. First, the relatively small dataset may affect the generalizability of our findings, as a larger sample could provide a more comprehensive representation of the phenomenon under investigation. Second, the survey distribution methods may have introduced selection bias, potentially influencing the composition of respondents and, consequently, the results. Third, entrepreneurial financing encompasses a variety of mechanisms, and it is possible that different funding models would yield distinct outcomes, limiting the extent to which our conclusions can be applied across different contexts. Finally, our data offers only a snapshot in time; longitudinal data collection at multiple intervals could provide a more nuanced and dynamic understanding of how these patterns evolve over time.*

Future research could enhance our findings by exploring and comparing the investment outcome of the VC search, also including Governmental Venture Capital (GVC) among investors. Future studies could also investigate how the behaviour of impact oriented ventures vary based on entrepreneurs' backgrounds and organizational structures.

Managerial implications. *Our findings contribute to the literature on impact oriented ventures by shifting the perspective to their unique needs and preferences in securing VC financing. Specifically, our findings demonstrate the much urgent need of equity financing for impact oriented ventures and suggest a hierarchy in the preference of VC form, with a clear tendency for these ventures to prioritize financing from investors who share and support their ideals and mission.*

These insights inform VC investors about potential funding preferences of ventures who typically may not search traditional form of investments, and instead prefer more impact oriented forms, especially if their mission is more substantially oriented to impact creation. From the perspective of the venture, these results also suggest how impact oriented ventures should approach managerial practices from a financing perspective.

Originality of the paper. *By inspecting the funding need of impact oriented ventures and their search for VC, with a special focus on the TVC and SIVC investors, our study contributes to the literature on the demand of impact oriented ventures. Findings show that impact orientation somehow increases the need of external financing, but at the same time discourages ventures from approaching traditional finance provides for start-ups, i.e., TVC. Instead, these ventures are more likely to seek funds from investors who align with their mission, i.e., SIVC. Further analysis highlights that this behaviour is especially prevalent among impact oriented ventures who integrate more sustainable managerial practices in their business model.*

Key words: *Impact oriented venture; Social Impact Venture Capital; Demand side*

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Understanding Paradoxical Thinking in Corporate Sustainability: Antecedents, Processes, and Outcomes

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Abstract

Complex challenges, such as those related to Corporate Sustainability, require complex solutions and complex minds to develop them. In this Systematic Literature Review (SLR) of 82 papers, we structure and organize the existing knowledge related to cognitive frames using paradox theory as a theoretical lens and corporate sustainability as context. The goal is to examine the antecedents that foster the cognitive complexity of paradoxical thinkers, to identify the distinctive cognitive processes they employ, and exploring the outcomes that result from these processes.

The literature underlined that cognitive frames are flexible structures that are influenced by personal features and contextual factors and evolve as the individual gains new knowledge. Moreover, individuals with paradoxical cognition, thanks to their cognitive complexity, are well equipped to face tensions in Corporate Sustainability: they are able to gather all the relevant information on the issue, interpret them, accept the inconsistencies inherent to the subject, and eventually adopt a positive stance toward the issue.

In conclusion, individuals with paradoxical cognition act seeking synergies or compromises while trying to influence the cognitive frameworks of those around them through discursive and motivational practices.

Framing of the research. *To organize and interpret ambiguous informational signals, such as those related to the three dimensions of Corporate Sustainability (CS), individuals rely on cognitive frames, which serve as "mental templates that individuals impose on an information environment to give it form and meaning" (Walsh, 1995, p. 281).*

The literature identifies various types of cognitive frames. Hahn et al. (2014) limit their research to two main cognitive frames ideal-types: the business-case and the paradoxical cognitive frame. The business-case cognitive frame avoids inconsistencies and ambiguities by applying a unified logic, resolving sustainability tensions by prioritizing economic goals; however, following an instrumental logic, if pursuing social and environmental goals allows to obtain economic benefits they engage with it. The paradoxical cognitive frame accepts that tensions cannot be entirely eliminated and instead accommodates and embraces the inconsistencies arising from the simultaneous pursuit of the three dimensions.

More recently, scholars have proposed a third cognitive frame. Defined as the "unidimensional frame" by Preuss & Fearne (2022), "grow first" (Giuliani et al., 2020) or the "business frame" by Sharma & Jaiswal (2018), this frame focuses exclusively on economic aspects, disregarding environmental and social considerations entirely.

Each cognitive frame addresses environmental and social challenges through distinct logic. The process through which individuals interpret such signals is known as sensemaking, which Hahn et al. (2014) describe as having three main components: scanning, consisting of information gathering, interpreting, which involves carving out meaning from information and responding, entailing the formation of an attitude toward the issue.

Although comparing the three cognitive frames is worthwhile, a focus solely on the paradoxical cognitive frame and the associated sensemaking process is a nuance perspective. This focus is due to the potential of paradoxical cognition to integrate the three dimensions of corporate sustainability effectively. By advancing research on this cognitive frame, we can gain insights into developing practical tools to tackle complex sustainability challenges.

The literature suggests the existence of other cognitive processes besides sensemaking (Maitlis & Christianson, 2014). Between these, there are sensebreaking (Pratt, 200) and sensegiving (Gioia & Chittipeddi, 1991).

Cognitive frames are not stable structures; they evolve as the individual gains experience (Gröschl et al., 2019). This process is facilitated by sensebreaking, which involves the disruption of existing cognitive frames, spurring individuals

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to question established assumptions and search for new interpretations of complex issues (Pratt, 2000; Kaffka et al., 2021). In the context of sustainability, sensebreaking can challenge dominant business logics, fostering openness to paradoxical perspectives and the accommodation of competing goals (Menon, 2022).

On the other hand, once the void has been created, organizational actors can influence individuals' cognitive frames by using sensegiving processes, through which individuals actively shape others' interpretations of ambiguous or complex issues, utilizing narratives, symbols, and other communicative tools to align organizational understanding and action (Gioia & Chittipeddi, 1991; Sharma & Good, 2013). In corporate sustainability, sensegiving plays a pivotal role in promoting shared values and motivating collective efforts to address paradoxical tensions (Hoppmann et al., 2023).

Purpose of the paper. *Since Hahn et al. (2014) conceptual work, empirical and theoretical studies have advanced understanding of how paradoxical cognitive framing functions in corporate sustainability, especially as it relates to decision-making and strategy (Boijca & del Rio, 2023; Sharma & Jaiswal, 2018; Schulte & Paris, 2024). This Systematic Literature Review (SLR) focuses on the paradoxical cognitive frame as it pertains to sustainability because this approach shows significant potential for accommodating the three dimensions of corporate sustainability, ensuring the long-term survival and success of businesses while addressing pressing global challenges (Hahn et al., 2014; Sharma & Jaiswal, 2018; Boijca & Martínez-Del-Río, 2023).*

This study is grounded in the growing body of literature on paradoxical cognitive frames in corporate sustainability which has reached a significant production. However, the contributions remain heterogeneous in their findings, highlighting the need for a cross-referenced analysis. Such an approach is essential to identify underlying themes and establish a coherent foundation for future developments in the field. Accordingly, this SLR aims to address the following research questions:

- *What are the antecedents to the development of a paradoxical cognitive frame concerning corporate sustainability?*
- *Which cognitive processes do individuals holding a paradoxical cognition use to make sense of paradoxical tensions related to corporate sustainability?*
- *What are the consequences of paradoxical sensemaking related to corporate sustainability?*

Methodology. *To respond to the three research questions, we decided to adopt the method of systematic literature review (Tranfield et al., 2003), with the following research design decisions.*

The research was conducted in Scopus database, including peer-review papers, therefore excluding books and books chapters, published in English between January 2014 and September 2024. This timeframe was chosen to capture studies published after Hahn et al.'s (2014) conceptual paper on paradoxical cognition and sensemaking, which spurred interest in paradoxical cognition as a critical aspect of decision-making in corporate sustainability contexts.

To develop our search strategy, we conducted multiple tests to optimize the search string. The final search string was as follows: (TITLE-ABS-KEY (sustainab OR csr OR "corporate sustainab*" OR cs* OR hybrid) AND TITLE-ABS-KEY ("cognitive frame*" OR "mindset" OR sensemaking OR micro* OR leader* OR manage* OR entrepreneur* OR consumer* OR customer* OR employee* OR individ* OR persona*) AND ALL (paradoxical)).*

This search string allowed us to identify articles examining how various categories of individuals face paradoxical situations in sustainability-related decisions. Our pool encompassed both for-profit and hybrid organizations, ensuring a broad perspective on corporate sustainability challenges.

The search algorithm yielded 876 results in the Scopus database, which were screened using the following inclusion criteria (Figure 1).

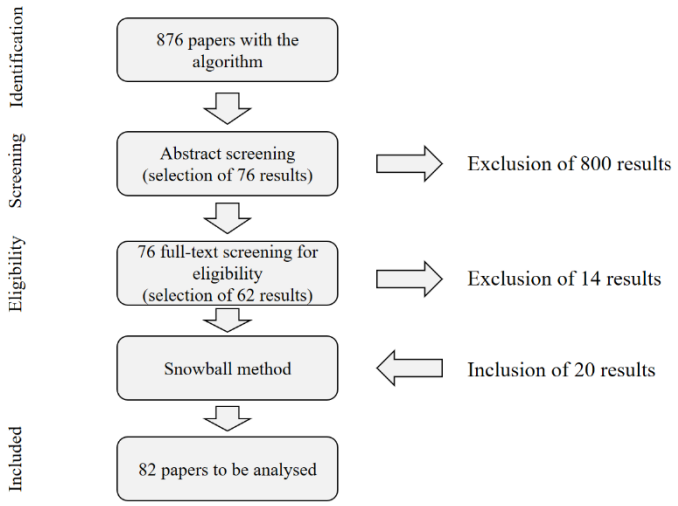
To ensure the inclusion exclusively of high-quality papers, we included only articles from journals listed in the ABS ranking. We then proceeded to eliminate all the contributions that did not refer to at least two of the three dimensions of sustainability to justify the presence of paradoxical tensions. We included only the papers that had a focus on the individual level, therefore excluding all the paper with an organizational or systemic focus. An initial abstract screening yielded 76 articles, which were further screened in an interactive process by all the authors via text. We retained papers that contributed to at least one of the following research areas: factors facilitating the development of paradoxical cognition, cognitive processes involved in making sense of ambiguous sustainability cues, and outcomes of these processes. After full-text screening, we retained 62 articles that met our criteria, which we integrated using the forward and backward snowballing process (Wohlin, 2014), including 20 other results. This process resulted in a final set of 82 articles for analysis.

Finally, we used an Excel data extraction sheet (Rashman et al., 2009; Calabrò et al., 2019) to identify recurrent patterns, shifts, and trends (Saunders et al., 2009).

Results. *Episodic antecedents are specific, time-limited events that prompt the development of paradoxical cognition. These events include sensebreaking episodes, which disrupt existing mental frameworks and prompt individuals to seek alternative interpretations and understandings. Examples of episodic antecedents highlighted in the literature are exposure to diverse geographical and cultural contexts, professional transitions, experiential educational opportunities, and mindfulness experiences (Gröschl et al., 2019; Menon, 2022). Immersive intercultural experiences, such as living or studying abroad, challenge existing cognitive schemas by exposing individuals to diverse values and perspectives, thus encouraging the adoption of a more complex cognitive frames (Mafico et al., 2021). Similarly, professional transitions introduce new cognitive challenges that prompt individuals to develop more integrative cognitive frames to manage paradoxical tensions effectively (Preuss & Fearne, 2022). Experiential learning, such as pedagogical activities designed to immerse students in real-world scenarios emphasizing sustainability tensions, fosters cognitive complexity by requiring students to manage conflicting sustainability dimensions actively (Smith et al., 2012; Al Taji & Bengo, 2019). Mindfulness*

experiences further contribute by enhancing individuals' self-reflection, critical thinking, and adaptability, enabling deeper engagement with paradoxical sustainability tensions (Sajjad et al., 2024).

Figure 1:PRISMA flow diagram



Resource-based antecedents, by contrast, are enduring personal traits or stratified experiences that support the ability to think paradoxically. These include emotional complexity, cultural background, values, educational and working background, and spirituality. Emotional complexity, defined as the ability to simultaneously process and integrate both positive and negative emotions, supports paradoxical thinkers by enabling them to cope with the emotional strain associated with sustainability challenges (Sharma & Good, 2013). Cultural background significantly influences the development of paradoxical cognition, with research suggesting that indigenous managers or managers from Latin American contexts often exhibit enhanced capabilities for managing sustainability paradoxes due to cultural norms emphasizing interconnections between social, economic, and environmental goals (Angulo-Ruiz & Muralidharan, 2023). Values play a critical role, with individuals who strongly endorse self-transcendence and universalism being better equipped to embrace paradoxical tensions in sustainability (Moura-Romero et al., 2024). Educational and working backgrounds also shape cognitive complexity. Diverse professional experiences across sectors increase the capacity to manage sustainability paradoxes, while educational backgrounds in non-business disciplines tend to foster paradoxical thinking more readily than business-oriented education (Carollo & Guerci, 2018). Finally, spirituality and philosophical inquiry enhance cognitive complexity by motivating individuals to critically reflect on existential questions, thereby fostering a nuanced understanding of sustainability tensions (Gröschl et al., 2019).

The sensemaking process itself is structured into three distinct phases: scanning, interpreting, and responding, as described by Hahn et al. (2014) and Walsh (1995).

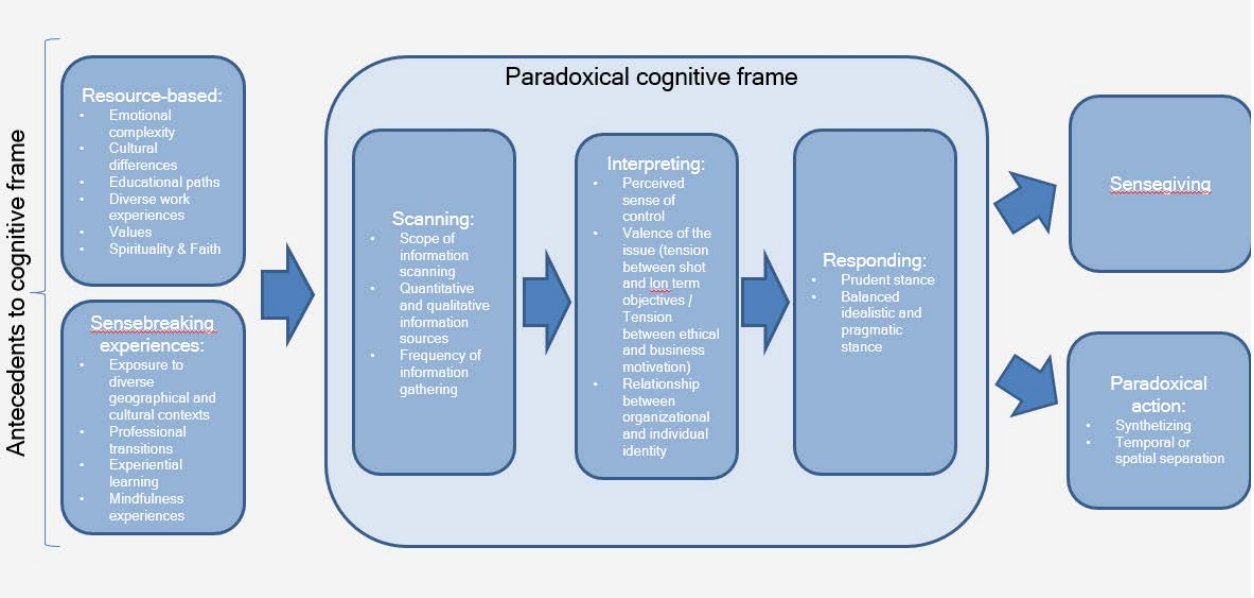
Scanning involves gathering information perceived as relevant based on an individual's cognitive content and structure. It is influenced by emotional complexity, which allows paradoxical thinkers to navigate ambiguity without experiencing overwhelming emotional distress (Sharma & Good, 2013). Paradoxical thinkers balance breadth and depth, gathering information broadly across economic, environmental, and social domains, while still conducting detailed searches when required (Corbett et al., 2018; Busch et al., 2020). Their integrative learning capacity fosters a continuous search for new knowledge, enhancing the complexity and richness of their interpretations (Vallaster et al., 2019).

Interpreting involves extracting meaning from information gathered during scanning. Paradoxical thinkers often experience ambivalent interpretations due to balancing competing sustainability attributes across temporal dimensions-short-term economic objectives and long-term ethical, social, and environmental considerations (Sasse-Werhahn et al., 2020; Guerci & Carollo, 2018). Despite earlier suggestions by Hahn et al. (2014) regarding paradoxical thinkers' moderate sense of control, recent studies suggest a higher perceived control due to their cognitive complexity and proactive nature (Busch et al., 2020; Boijca & Martínez-Del-Río, 2023). This ambivalence in valence often emerges from balancing economic motivations with ethical drivers, resulting in nuanced evaluations of sustainability issues that incorporate both positive opportunities and challenging trade-offs (Dhanesh, 2020; Sasse-Werhahn et al., 2020).

Responding, the final sensemaking phase, encompasses the mental stance toward sustainability issues that predisposes individuals toward certain actions. Paradoxical thinkers typically adopt prudent or balanced stances, consciously navigating between idealistic aspirations and pragmatic considerations (Ashforth & Reingen, 2014; Gopakumar & Gupta, 2023). This balanced approach allows them to set ambitious sustainability goals while ensuring practical feasibility.

Finally, the outcomes of sensemaking manifest in sensegiving and concrete actions. Sensegiving, a political and communicative process, involves influencing how others interpret sustainability issues, shaping collective cognitive frames through narratives, symbols, and motivational tactics (Poon & Law, 2022; Sharma & Good, 2013). Paradoxical action typically includes synthesizing, integrating economic, social, and environmental dimensions simultaneously, or splitting strategies, addressing these dimensions separately, either temporally or spatially (Xiao et al., 2019; Epstein et al., 2015). These strategic actions reflect the cognitive complexity inherent in paradoxical cognition and allow for effective management of sustainability paradoxes.

Figure 2: Paradoxical thinkers processes, antecedents and consequences



Research limitations. *First, the research exclusively examines paradoxical thinking within corporate sustainability due to inherent tensions across economic, social, and environmental dimensions, but external validity beyond sustainability contexts hasn't been tested.*

Second, cognitive frames were analyzed as static structures, not accounting for how these evolve dynamically. This limitation arises from a scarcity of longitudinal studies exploring the development of paradoxical cognition over time.

Third, cognitive antecedents and structures were studied without exploring contextual influences like industry-specific characteristics or cultural settings. The absence of detailed exploration of these contextual elements represents a further limitation.

Managerial implications. *First, we highlight the importance of experiential learning, suggesting that organizations can use sensebreaking experiences (Menon, 2022), through redirecting, reframing and questioning strategies (Kaffka et al., 2021), to promote sustainability practices and foster paradoxical cognition among employees at different organizational levels.*

Second, this review offers valuable insights for human resource practices, helping managers identify and select individuals with the cognitive characteristics and personal resources necessary to proactively address sustainability tensions.

Originality of the paper. *This paper uniquely synthesizes episodic and resource-based antecedents influencing paradoxical thinking. Examining episodic antecedents, sensebreaking, originally defined by Pratt (2000) as the disruption of one's existing meaning structures, is pivotal in developing paradoxical cognition. Recent expansions by Kaffka et al. (2021) identify socially situated sensebreaking, where external feedback unintentionally challenges managers' mental frameworks. Three core mechanisms-redirecting, reframing, and questioning underlying assumptions-characterize this process (Vlaar et al., 2008; Kaffka et al., 2021).*

Furthermore, the study extends and identify inconsistencies between Hahn et al.'s (2014) sensemaking conceptual model by incorporating recent empirical findings, offering a more nuanced understanding of how paradoxical thinkers navigate tensions between economic, social, and environmental sustainability dimensions.

Outcomes of paradoxical sensemaking include sensegiving and action strategies. Sensegiving, occurring both top-down and bottom-up (Hahn & Aragón-Correa, 2015), involves influencing peers through discursive and motivational practices. Paradoxical thinkers primarily adopt synthesizing strategies to integrate sustainability dimensions, though separating strategies, involving temporal or spatial separation, are also prevalent (Epstein et al., 2015; Xiao et al., 2019).

Key words: *Paradox theory, Sensemaking, Cognitive frame, Antecedents, Corporate Sustainability, Systematic Literature Review*

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Assessing costs and benefits of a Nature-based Solution through a triple bottom line and participatory approach

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Abstract

The increasing frequency and intensity of climate-related disasters have underscored the need for effective risk management strategies that enhance resilience while mitigating socio-economic and environmental impacts. Nature-based Solutions (NBS) have emerged as a promising approach, offering multiple co-benefits across ecological, social, and economic dimensions. However, existing assessments often fail to account for the complex trade-offs and synergies associated with NBS implementation. Additionally, they rarely take into account the impacts on the whole platea of stakeholders affected. This study seeks to address these gaps by adopting a participatory approach to evaluate stakeholders' awareness of the costs and benefits linked to NBS.

Focusing on a coastal restoration project in the Tuscany region developed within the Horizon-funded Regions4Climate initiative, our research is grounded on a qualitative methodology. We first conduct a literature review to categorize NBS' costs and benefits within the Triple Bottom Line (TBL) framework. Subsequently, we integrate stakeholder perspectives through interviews and participatory workshops, aiming to explore synergies and trade-offs among economic, social, and environmental dimensions. By involving diverse stakeholder groups - including policymakers, private enterprises, civil society organizations, and scientific experts - this study aims to provide a more comprehensive understanding of how NBS impacts are perceived.

The anticipated outcomes of this research include a preliminary version of an analytical framework that systematically maps NBS costs and benefits against stakeholder awareness, highlighting potential conflicts, synergies, and areas of consensus. This study contributes to the literature on assessment frameworks of NBS adopting a participatory approach. On a practical perspective, the participatory assessment of trade-offs and synergies can help decision makers in identifying critical areas and potential conflicting objectives for management, as well as opportunities for strengthening synergies.

Framing of the research. *The increasing frequency and intensity of climate-related disasters underscore the urgent need for effective risk management strategies capable of mitigating their socio-economic and environmental consequences. In response, integrated ecosystem-based approaches, such as Nature-based Solutions (NBS), have gained prominence as viable alternatives probing to be effective in mitigating risks by leveraging natural features and enhancing climate resilience (Van Slobbe et al., 2013; Temmerman et al., 2013; Ferrario et al., 2014; Spalding et al., 2014).*

NBS represent an evolution of ecosystem-based approaches by integrating ecological processes with human interventions to enhance adaptation and mitigation efforts, conserve biodiversity, and improve human well-being (Cohen-Shacham et al., 2016). Although their conceptualization remains subject to ongoing debate, NBS are widely regarded as an "umbrella concept" encompassing diverse ecological, social, and technological interventions (Nesshöver et al., 2017; Pauleit et al., 2017). A unifying characteristic of NBS is their multifunctionality-their ability to generate co-benefits across environmental, social, and economic domains (Kabisch et al., 2016; Albert et al., 2017). These include biodiversity conservation, pollution mitigation, climate adaptation, improved public health, job creation, cost-effectiveness and adaptability (Cohen-Shacham et al., 2016; Raymond et al., 2017a; Keesstra et al., 2018). Nonetheless, alongside these benefits, NBS can also produce ecosystem disservices, which should be considered as co-costs (Calliari et al., 2019).
Recognizing the complexity of NBS highlights the need for a comprehensive assessment of their impacts, which should incorporate diverse stakeholder perspectives. Multiple stakeholder engagement, in fact, has been shown to enhance environmental decision-making, particularly when built on principles of empowerment, trust, and social learning (Young et al., 2007; Reed, 2008; Pistorius & Reinecke, 2013).

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However, participation occurs along a spectrum, ranging from passive information dissemination to active co-creation and transformative engagement (Arnstein, 1969; Pretty, 1995; Farrington, 2014). While higher levels of engagement are often encouraged, recent studies suggest that the most appropriate level of participation depends on the specific context, stakeholders' capacity to influence outcomes, and project objectives (Richards et al., 2004; Tippett et al., 2007).

Purpose of the paper. *A comprehensive evaluation of NBS requires a rigorous assessment of both benefits and costs, taking into account trade-offs across different challenge areas and recognizing potential synergies. In this regard, while existing literature provides a solid foundation for understanding the various impacts of NBS, it tends to adopt a compartmentalized perspective. Thus, a much clear understanding of the interface between environmental, economic and social dimensions of NBS is still lacking. This limitation has been noted in multiple studies, which highlight the need for a more holistic perspective in assessing NBS trade-offs (Liquete et al., 2016a; Narayan et al., 2017; Raymond et al., 2017a, b; Calliari et al., 2019; Viti et al., 2022).*

Moreover, the involvement of multiple stakeholders, each with distinct interests and problem framings, further complicates this assessment, as different values coexist - sometimes in conflict.

Existing research has primarily relied on the ecosystem services framework to quantify the biophysical and economic value of NBS, particularly in urban areas (Baró et al., 2015; Liquete et al., 2015; Green et al., 2016). However, many of these studies focus on isolated indicators or challenge areas, such as ecosystem service valuation (Maes, 2013; Mouchet et al., 2017), climate mitigation co-benefits (Bain et al., 2015; Rao et al., 2016), environmental drivers of change (Díaz et al., 2015), and cost-benefit analyses (Ürge-Vorsatz et al., 2014). While valuable, these approaches fail to capture the multidimensional nature of NBS, which requires integrated evaluation frameworks that assess interdependencies across multiple domains. Additionally, NBS impact assessments often draw upon expert knowledge, while there are a range of other types of knowledge (e.g., indigenous, local, tacit) which require consideration in NBS impact assessments (Raymond et al., 2017a).

Few attempts have been made towards the investigation on the interplay between costs and benefits. For instance, synergies have been observed in areas such as water management and temperature control, while conflicts often relate to the allocation of limited physical space (Eftec, 2013). These synergies can extend beyond economic gains-such as reduced management and investment costs or economies of scale-to encompass social benefits, including community interaction in public green spaces and educational opportunities, as well as environmental advantages like enhanced biodiversity. Conversely, challenges may arise from nature conservation measures themselves, particularly where competition over land or other resources exists. Conflicts may also stem from incompatible human uses or environmental degradation, alongside socio-political tensions resulting from the unequal distribution of costs and benefits (Eftec, 2013; Piwowarczyk et al., 2013).

All this considered, we identify two main gaps relating to the impact assessment of NBS. First, previous works provide a quite comprehensive picture of costs and benefits individually considered, but there is less clarity on the potential synergies and trade-offs stemming from them. In this regard, the nature of the relationship between the various impacts of NBS requires further investigation, as both trade-offs and synergies may emerge. For instance, how NBS contribute to social justice, social capital and social cohesion, is still unclear (Raymond et al., 2017a).

Second, although there is broad consensus that robust assessments of NBS should be grounded in participatory approaches that engage all relevant stakeholder groups, there remains a notable lack of structured guidance on how stakeholder engagement can be operationalized in practice. Existing methodologies for evaluating socio-economic and ecological benefits still require refinement in order to effectively capture the diverse perspectives, experiences, and forms of knowledge held by different stakeholder groups (Ruangpan et al., 2019). In this regard, the interaction between different types and systems of knowledge constitutes a further gap in both academic research and practical application.

This study aims to address these limitations by adopting a multidimensional and participatory approach to explore the relationships between the impacts of NBS implementation. Accordingly, the purpose of this paper is twofold.

First, we seek to develop a more comprehensive framework for assessing the impacts of NBS by explicitly accounting for synergies and trade-offs among economic, social, and environmental dimensions. To this end, we address the following research question:

RQ1: What economic, social, and environmental benefits and costs do stakeholders identify in the implementation of NBS for coastal restoration? What synergies and trade-offs emerge from the identified co-benefits and co-costs across different stakeholder groups?

Second, we aim to contribute to the ongoing call for empirical studies that integrate participatory approaches into NBS impact assessment. In particular, we focus on the cognitive dimension of stakeholder engagement by examining the types of understanding and knowledge that different groups of stakeholders hold regarding NBS impacts. In doing so, we seek to answer the following research question:

RQ2: What types of knowledge do different stakeholder groups possess in relation to NBS impact assessment?

This paper represents a work in progress and builds upon a previous version presented last year (Condomitti et al., 2024), incorporating significant refinements to the research design. The study's focus has shifted from stakeholder classification to a more in-depth analysis of how the participatory approach contributes to the assessment of NBS' impacts in terms of costs and benefits. To achieve this, the empirical analysis has been expanded to include an iterative process of interviews and workshops, ensuring continuous stakeholder engagement throughout the entire implementation period.

Additionally, the literature review on the identification of NBS costs and benefits has been updated to reflect the latest advancements in the field.

Methodology. *To address these research questions, we conduct a case study in the Tuscany region of Italy as part of the Horizon project Regions4Climate. The project aims to tackle coastal erosion and enhance adaptation strategies through the implementation of a NBS consisting in the restoration of the dune ecosystem in that area.*

Our work is grounded on a qualitative methodology, combining desk study and empirical observations with key actors. First, we conducted a literature review to identify costs and benefits. This analysis included both academic and grey articles. The findings were categorized using the Triple Bottom Line (TBL) framework, classifying costs and benefits under economic, social, and environmental dimensions. Second, we will conduct empirical research through a series of interviews with selected stakeholders in order to triangulate the data and validate the results stemming from the literature review. These interviews will be followed by workshops aimed to deeper investigate the positive (synergies) or negative (trade-offs) relationships between costs and benefits. During this step we will as well investigate the level of understanding and the type of engagement of multiple stakeholders' group.

In order to do so, our first step consisted in the stakeholders' mapping and selection. This step played a critical role in ensuring a comprehensive and unbiased assessment of the NBS implementation process. Given the inherent diversity of perspectives, interests, and levels of influence, particular attention was paid to minimizing selection bias and avoiding stakeholder marginalization (Ananda & Herath, 2003; Reed et al., 2009). The identification process followed a two-stage approach. Initially, project partners compiled a preliminary list of local stakeholders, which was subsequently validated through data triangulation, drawing on previous academic studies. A key reference in this phase was Sarabi et al. (2019), who propose a four-level classification of actors relevant to NBS development, distinguishing between micro, meso, macro, and transboundary stakeholders.

Micro-level actors include citizens, landowners, business owners, entrepreneurs, and representatives of civil society organizations such as NGOs. Meso-level actors, operating at the local level, encompass municipal and provincial decision-makers responsible for public management and policy implementation (Guan et al., 2022; Liquete et al., 2016a). At a broader scale, macro-level actors engage at regional, national, and international levels, including governmental agencies and intergovernmental institutions that shape regulatory frameworks and funding mechanisms. Lastly, transboundary actors transcend geographical and institutional boundaries, serving as knowledge brokers who facilitate collaboration and knowledge exchange. This category comprises scientific and technical experts, educational institutions, and intergovernmental bodies that contribute to the diffusion and operationalization of NBS within multi-stakeholder networks (Guan et al., 2022; Liquete et al., 2016a).

Results. *This paper is work-in-progress and presents preliminary findings on the multidimensional impact assessment of NBS (RQ1). To answer to the first research question, we developed a robust methodology to assess costs and benefits consisting in two steps. The first step consisted of a literature review, aimed at identifying the costs and benefits of NBS implementation. The results were classified applying the Triple Bottom Line (TBL) framework that incorporates economic, social, and environmental dimensions (Fig 1).*

From an economic standpoint, NBS proved to be cost-effective (EC, 2015; Liquete et al., 2016; Keesstra et al., 2018). However, Calliari et al. (2019) find that construction and maintenance costs of NBS may reach levels similar to that of traditional engineering options, while Liquete et al. (2016) find that they can slightly exceed those of a traditional grey infrastructure.

Considering the social dimension, benefits of implementing a NBA include a broad list on ecosystem services, such as regulating, provisioning, cultural and supporting services (Liquete et al., 2016). They also contribute to ameliorating human health and wellbeing (Mitchell et al., 2015; Cohen-Shacham et al., 2016). Other benefits include improving recreational opportunities (Chang et al., 2017), accessibility (López-Mosquera and Sánchez, 2011) and long-term livability of the areas interested by the NBS. They also create the opportunity to foster the creation of green jobs (Van der Jagt, 2017) and they can help in building adaptive capacity of communities (Seddon et al., 2020). Additionally, they can enhance social interaction, social sensitivity (Valenzuela et al., 2020) and social equality by improving environmental conditions for people living in deprived communities (Mitchell et al., 2015). Finally, they can improve environmental justice (REF). On the other side, they can create social costs in terms of loss of social cohesion (Raymond et al., 2017).

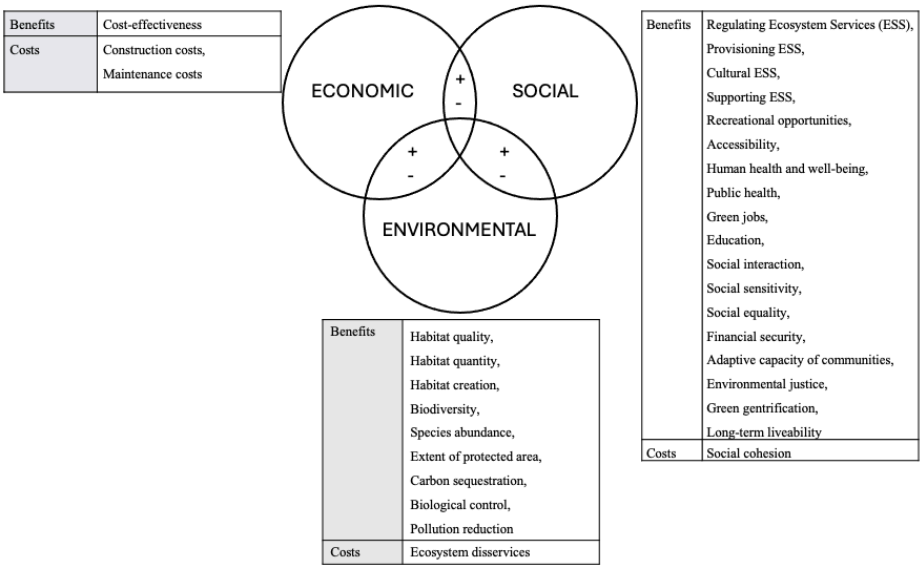
On the cross-roads between economic and social dimension, NBS can be beneficial since they can provide financial security (Ahammad et al., 2013; Waldron et al., 2017).

Considering the environmental dimension, NBS can benefit the habitat quality, quantity and habitat creation (Dushkova & Haase, 2020), as well as biological control, biodiversity and species abundance (Thompson et al., 2018). They can also help in extending the dimension of protected areas and reduce the vulnerability of the social-ecological system (Seddon et al., 2020). Finally, they contribute to pollution reduction and carbon sequestration (Chang et al., 2017). Environmental costs can involve ecosystem disservices (Calliari et al., 2019).

In order to validate the findings from the literature review and identify synergies and trade-offs among these impacts, a second step for the assessment of costs and benefits will be conducted through an empirical examination by engaging directly with stakeholders. The empirical phase of the research is structured into two main steps. Initially, a series of interviews will be conducted with consortium partners, focusing on specific areas of impact analysis, particularly within the economic domain. This phase will also serve to expand the list of costs and benefits, leveraging the technical expertise and practical experience of these actors.

Building on these insights, a second phase will involve participatory workshops designed to foster stakeholder interaction. These workshops will bring together representatives from different stakeholder categories, including private enterprises, academic and scientific communities, policymakers, civil society organizations, and industry associations. This phase aims to stimulate dialogue and exchange of perspectives, particularly on the synergies and trade-offs that emerge from NBS implementation. The interactive nature of these discussions will allow for a more nuanced characterization of costs and benefits, clarifying their interdependencies (RQ2).

Fig. 1: Economic, social and environmental costs and benefits identified through the literature review



Research limitations. *One key limitation is the restricted generalizability of our findings. The case study methodology provides valuable insights into a specific context, but its applicability to different settings remains constrained. To enhance generalizability, future research should consider replicating this study across diverse geographical and socio-economic contexts, enabling comparative analyses that could identify common patterns and context-specific variations.*

Another limitation pertains to stakeholder sampling. Despite our efforts to ensure a balanced representation of different stakeholder categories through triangulation with classifications established in the literature, potential biases may have influenced the identification of costs and benefits. The perspectives captured in this study are inherently shaped by the composition of the participant group, which may not fully reflect the diversity of viewpoints within the broader stakeholder ecosystem. Future research could address this limitation by adopting more extensive sampling strategies, incorporating a larger and more heterogeneous pool of stakeholders.

Additionally, this study provides a qualitative assessment of NBS benefits and costs. While this approach allows for a nuanced exploration of perceptions, trade-offs, and synergies, the lack of quantitative measurement limits the precision of impact evaluation. Future research could complement these findings by incorporating quantitative methodologies, such as cost-benefit analysis or multi-criteria decision analysis, to systematically assess the magnitude of benefits and costs, as well as the intensity of synergies and trade-offs identified. Integrating qualitative and quantitative approaches would strengthen the robustness of the evaluation and provide a more comprehensive understanding of NBS impacts.

Finally, while the scope of our study involves the impact assessment stage of NBS, it is critical to extend the stakeholder engagement approach to the entire life cycle of the NBS - from its design to its evaluation and potential replication. Future research should investigate how to effectively define engagement strategies for each and every phase of NBS implementation.

Managerial implications. *The practical implications of this study primarily target public managers and decision-makers. Our analysis concerning benefits, costs, synergies, and trade-offs aids in identifying critical areas and potential conflicting objectives for management, as well as opportunities for strengthening synergies. Thus, the study aims to furnish best practices and solutions for minimizing conflicts and maximizing benefits.*

Originality of the paper. *This research makes original contributions to both theoretical and practical domains.*

Theoretically, it enriches the literature on stakeholders' awareness related to NBS impact assessment by exploring the interrelationships between costs and benefits. While previous literature has focused on identifying costs and benefits, limited efforts have been made to capture potential synergies and trade-offs among them. Moreover, grounding our research on a participatory approach that requires the engagement of multiple categories of stakeholders, we broaden the scope of traditional impact assessment by investigating the level of engagement and the different forms of understanding of multiple stakeholders.

Practically, we provide valuable results for policy and decision-makers about the state of the art of stakeholders' awareness and engagement about NBS impact. These insights can be helpful in order to design programs aimed at improving literacy about NBS at the local scale, as well as to motivate local actors' involvement in NBS implementation.

Key words: *Climate change; Nature-based Solutions; coastal restoration; stakeholder theory; stakeholder engagement; Horizon project*

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Exploring Customer-Centric Sustainability and Brand Relationships in Fast Fashion: Evidence from Indian Consumers

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Abstract

This work-in-progress (WIP) study investigates how Customer-Centric Sustainability (CCS) strategies influence consumer-brand relationships in the fast fashion industry. While fast fashion brands are often criticised for their unsustainable practices, many are now adopting consumer-facing sustainability initiatives that address economic, environmental, and social concerns. Grounded in the CCS framework proposed by Sheth et al. (2011), this research examines the impact of each sustainability dimension on brand trust, affective brand commitment, and brand loyalty intentions. It further explores how individual differences in sustainability knowledge and concern moderate these relationships.

Data are being collected through an online survey of Indian consumers with recent fast fashion purchase experience. Preliminary analysis will be followed by exploratory and confirmatory factor analysis, and structural equation modeling to test the proposed hypotheses. The study contributes to literature by integrating sustainability marketing with brand relationship theory and provides practical insights for managers seeking to strengthen loyalty through authentic sustainability efforts.

Framing of the research. *The global fast fashion industry (FFI) has transformed the way consumers engage with fashion, offering affordable, trend-driven clothing with rapid turnover. Fast fashion brands have built business models centred around speed and accessibility, driving mass consumption and fuelling a culture of disposable fashion (Barnes & Lea-Greenwood, 2006). This model relies on shortened production cycles, low-cost manufacturing, and frequent new collections that encourage impulsive buying behaviour (Joy et al., 2021). The Quick Response strategy, which coordinates the supply chain to minimise time-to-market, helps these brands stay ahead of trends and stimulate continuous purchasing (Golobovante et al., 2018).*

While economically successful, this model poses profound sustainability challenges across the fashion supply chain. In the production phase, it contributes to environmental degradation through resource-intensive manufacturing, excessive water use, and hazardous chemicals that harm ecosystems (Niinimäki et al., 2020; Zhang et al., 2021). Socially, the pressure to reduce costs often results in poor labour practices, such as low wages and unsafe working conditions in garment factories (Turker & Altuntas, 2014). Sustainability concerns also extend to the distribution and consumption phases, as global logistics generate high carbon emissions and packaging waste, while consumers discard clothing quickly due to its poor durability and planned obsolescence (Niinimäki et al., 2020; Park et al., 2017).

In response to these issues, the fashion industry has seen a growing emphasis on sustainable practices. Public awareness and consumer demand for ethical fashion have prompted major fast fashion brands to introduce eco-conscious collections-such as Zara's Join Life, Mango's Committed Collection, and H&M's Conscious line (Vedeikyte & Lechmanova, 2019). These efforts aim to align with ethical consumerism trends (Hill & Lee, 2015), but they are often criticised as superficial or tokenistic, as they continue to encourage excessive consumption (Vedeikyte & Lechmanova, 2019).

Despite rising awareness of fast fashion's environmental and social impacts, many consumers continue to purchase from these brands. This reveals a well-documented paradox: ethical concerns do not always translate into sustainable purchasing behaviour (Joy et al., 2012; McNeill & Moore, 2015). In light of this, and in an effort to align with shifting consumer expectations, fast fashion brands are increasingly adopting strategies that position sustainability as a consumer-facing value. Customer-Centric Sustainability (CCS) is one such approach that integrates environmental, social, and economic sustainability into marketing and brand-consumer interactions (Sheth et al., 2011). Unlike

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traditional CSR, which focuses on firm-level responsibility, CCS places the consumer at the core, highlighting how sustainable practices can enhance customer experience, build trust, and deepen brand engagement (Park & Kim, 2016a).

Existing research on fast fashion and sustainability has primarily focused on environmental impact, ethical sourcing, and corporate sustainability initiatives (Turker & Altuntas, 2014; Niinimäki et al., 2020). However, limited studies have examined the effectiveness of CCS in shaping brand trust, brand loyalty, and brand commitment. This work-in-progress study aims to address this gap by investigating the influence of CCS dimensions (economic, environmental, and social) on brand trust, affective brand commitment, and brand loyalty intentions among Indian fast fashion consumers. It also explores the moderating role of sustainability knowledge and concern. By doing so, this research contributes to both academic theory and managerial practice. The study extends CCS literature by linking sustainability to brand relationship theories and sustainability marketing while providing empirical evidence on how sustainability awareness and concern shapes consumer responses. From a managerial perspective, the findings will offer insights for fast fashion brands on how to align sustainability efforts with evolving consumer values and expectations. Ultimately, this study aims to provide a deeper understanding of how fast fashion brands can build trust-based, long-term relationships with consumers through authentic and transparent sustainability efforts.

The following sections provide an overview of the three CCS dimensions, followed by a discussion of how they may influence brand trust, affective brand commitment, and brand loyalty intentions in the context of fast fashion.

Customer-centric sustainability (CCS)

The CCS stems from the stakeholder perspective wherein firms integrate stakeholder expectations into their business actions and thereby resolve different perspectives on sustainability issues and outcomes (Kozlowski et al. 2012). The lack of consumer involvement in the Triple Bottom Line (TBL) approach paved way for a new approach, known as the customer-centric sustainability approach, which places customers at the core of the framework. This approach was proposed by Sheth et al. 2011, who defined CCS as the consumption-mediated impact of marketing actions on environmental, personal and economic well-being of the consumer. They argued that sustainability outcomes must result from consumer-directed business actions, if companies plan to make sustainability an integral part of their business strategies and operations. Thus, CCS outcomes are a joint product of marketing action and consumer behaviour (Sheth et al. 2011).

<u>CCS: Economic dimension</u>

The economic dimension of sustainability is often perceived as focusing solely on financial profitability, as highlighted in traditional interpretations like the "planet, people, profit" framework (Slaper and Hall 2011). However, in line with Elkington's TBL approach, which emphasises firms' economic performance and profitability, the CCS framework proposed by Sheth et al. (2011) offers a more comprehensive perspective. This approach expands the economic dimension to include not only the financial performance of firms but also the economic interests of external stakeholders, particularly consumers, through broad-based improvements in economic well-being and standards of living.

In the CCS framework, sustainability is viewed as a shared outcome of firm and consumer actions-a form of business-consumer reciprocity. Brands are expected not only to produce responsibly but also to enable consumers to make financially sustainable choices. One of the most tangible ways to support this is by offering high-quality, durable products that reduce the need for frequent repurchase and thus relieve economic pressure (Park & Kim, 2016a).

Consumption is a key indicator of economic welfare, with higher levels of consumption typically associated with a better quality of life. However, it is the quality of consumption-rather than quantity-that plays a more critical role in promoting sustainability and consumer well-being (McNeill & Moore, 2015). For economically sustainable firms, addressing the economic well-being of consumers is essential, with a particular focus on product quality. Quality is, in fact, one of the main features that consumers most associate with sustainability, which is directly related to their perceptions that buying the highest quality available is the same as buying more sustainable products (Nogueira et al. 2023). Therefore, when fashion brands offer quality products, they not only support sustainable consumption but also demonstrate a commitment to the broader economic system beyond their financial gains (Fulton and Lee 2013).

Fast fashion products are often criticised for being made with poor-quality materials and construction (Joy et al. 2012). Quality, durability, and comfort are key indicators valued by consumers, and investing in these attributes signals a brand's concern for the economic well-being of its customers, as they do not need to repurchase products as frequently. Thus, the CCS framework positions the economic dimension of sustainability as a dual responsibility: ensuring financial profitability while simultaneously enhancing consumer economic well-being through high-quality, durable products.

<u>CCS: Environmental dimension</u>

The environmental dimension of CCS relates to impact of consumption on environmental well-being, that is, health and human well-being consequences of environmental change ensuing from consumption (Sheth et al. 2011). Unlike traditional CSR approaches that focus on firm-level emissions or waste, CCS emphasises how marketing actions and consumption choices affect human and environmental health.

The FFI is widely regarded as one of the most environmentally damaging sectors, contributing to excessive water usage, toxic chemical discharge, greenhouse gas emissions, and large volumes of textile waste (Zhang et al., 2021;

Niinimäki et al., 2020). The industry's rapid production cycles and culture of disposability have normalised overconsumption and short garment lifespans (Joy et al., 2021), leading to widespread environmental degradation.

In response to mounting sustainability concerns, fast fashion brands have launched initiatives such as organic cotton lines, recycling programs, and carbon reduction strategies (Park & Kim, 2016a; Vedeikyte & Lechmanova, 2019). Notable examples include H&M's Conscious Collection and Zara's Join Life, which promote the use of recycled materials and encourage clothing take-back schemes. While these efforts aim to appeal to ethically minded consumers, they are often criticised as reactive, limited in scope, and primarily driven by branding motives rather than a genuine commitment to systemic change (Park & Kim, 2016a). Research also points to a disconnect between brand messaging and actual environmental performance, particularly when outsourced suppliers do not adhere to sustainability standards (Nogueira et al., 2023). Despite this, CCS offers a framework to engage consumers in shared environmental responsibility, encouraging sustainable behaviours through transparent communication and product design (Sheth et al., 2011).

CCS: Social dimension

The social dimension of CCS framework relates to the impact of production and consumption on the personal well-being and quality of life of the consumers on a micro level and the associated welfare of the community on a macro level (Sheth et al. 2011, Park and Kim, 2016a). The social aspect of sustainability adds a sense of community to sustainable development by emphasizing concern for others in ways such as fair wages, access to health and education, and fair labour conditions, not only for employers but also for the communities who are exposed to the business throughout the supply chain (Waage et al. 2005). The social aspects of CCS in the FFI are connected to fair wages for factory workers, the working conditions of the workers, consumer preferences for locally made products, and perceptions of how fast-fashion companies contribute to the communities where they operate. Unfortunately, the FFI has its fair share of socially irresponsible practices, such as using sweatshops, paying poor salaries to workers, or overall poor working conditions. The pressure to cut costs often results in poor working conditions and exploitation of labour in garment factories, reflecting the social dimension of unsustainability.

Brand Relationships and CCS

CCS extends beyond traditional corporate sustainability efforts by focusing on how sustainability initiatives enhance consumer experience, trust, and engagement (Park & Kim, 2016a). Unlike standard CSR approaches that emphasise corporate responsibility at a strategic level, CCS positions sustainability as a consumer-driven value proposition, aiming to strengthen brand trust, brand loyalty, and brand commitment (Nogueira et al., 2023).

Brand Trust and CCS

Brand trust is broadly defined as the consumer's confidence in a brand's reliability, integrity, and ability to fulfil its promises (Erdem & Swait, 2004; Park & Kim, 2016a). From a sustainability perspective, trust develops when consumers believe that a brand is authentic in its ethical claims, consistent in its messaging, and committed to long-term values beyond profit (Neumann et al., 2021; Nogueira et al., 2023). However, scepticism remains high due to greenwashing concerns-when companies exaggerate or falsely claim sustainable practices (McNeill & Moore, 2015).

In the CCS framework, brand trust is reinforced when sustainability efforts are perceived as transparent, credible, and consumer centric. Erdem and Swait (2004) conceptualise trust as a key component of brand credibility, emphasising the brand's willingness (trustworthiness) and ability (expertise) to consistently deliver what it promises. Similarly, Park and Kim (2016a) measure brand trust through statements such as "this brand delivers what it promises" and "this brand has a name you can trust," which reflect consumer perceptions of honesty and reliability.

Affective Brand Commitment and CCS

Affective brand commitment refers to the emotional bond or attachment a consumer feels toward a brand, characterised by identification with the brand's values and a desire to maintain the relationship over time (Fullerton, 2005). Unlike continuance commitment (based on switching costs), affective commitment arises from genuine liking and emotional connection, often strengthened by shared ethical or sustainability values.

In sustainable branding, affective commitment may emerge when consumers see a brand as aligned with their personal values related to environmental protection, ethical labour, or social justice. Such commitment deepens consumer engagement, leading to brand advocacy and loyalty even in competitive markets (Fullerton, 2005; Nogueira et al., 2023). However, when sustainability is seen as a marketing tool rather than a core business principle, commitment declines (McNeill & Moore, 2015).

Brand Loyalty Intentions and CCS

Brand loyalty is typically defined as the intention to continue purchasing from or supporting a brand, often accompanied by positive word-of-mouth and advocacy behaviours (Zeithaml et al., 1996). Loyalty intentions are more than repeat behaviour - they reflect a psychological attachment that leads consumers to recommend, repurchase, and prioritise the brand over competitors.

Zeithaml et al. (1996) identify loyalty intentions as part of a broader framework of behavioural intentions, including recommending the brand, saying positive things about it, and repurchasing. In the context of fast fashion and sustainability, loyalty may stem from perceptions that a brand is genuinely committed to customer well-being and responsible consumption (Park & Kim, 2016a). Importantly, Fullerton (2005) distinguishes between loyalty driven by affective commitment versus continuance (habitual or constrained) loyalty, finding that emotional attachment is a stronger and more positive predictor of long-term brand support and advocacy.

Research suggests that consumers who trust a brand's sustainability efforts exhibit stronger loyalty (Algesheimer et al., 2005). However, in the fast fashion sector, loyalty is often transactional, driven by factors such as price and trend availability rather than sustainability commitment (Joy et al., 2012). While CCS initiatives may improve perceived brand authenticity, their direct influence on loyalty remains inconsistent (Neumann et al., 2021).

Drawing upon the CCS framework (Sheth et al., 2011) and previous empirical research (Park & Kim, 2016; Nogueira et al., 2023), this study proposes that each dimension of customer-centric sustainability-economic, environmental, and social-influences key brand relationship outcomes: brand trust, affective brand commitment, and brand loyalty intentions. As discussed, CCS emphasises consumer-facing sustainability efforts, where marketing actions, product quality, and ethical practices shape consumer perceptions and strengthen brand relationships.

Empirical evidence suggests that economic sustainability, when focused on offering durable, high-quality products and reducing financial burdens on consumers, can enhance consumer confidence, foster emotional attachment, and increase loyalty intentions (McNeill & Moore, 2015; Nogueira et al., 2023). Similarly, social sustainability, by addressing fair labour practices and community well-being, strengthens affective ties and trust in brand ethics (Park & Kim, 2016a). While environmental sustainability may appeal to ethically motivated consumers, its effects on brand relationships in fast fashion are often more limited or inconsistent, potentially due to perceptions of greenwashing or tokenism (Neumann et al., 2021).

Moderating Role of Sustainability Knowledge and Concern

Consumer responses to sustainability initiatives are not uniform; they are significantly shaped by individual differences in sustainability knowledge and sustainability concern. These two constructs-while interrelated-represent distinct dimensions of consumer awareness and engagement. Sustainability knowledge reflects the cognitive understanding of ethical and environmental issues in the fashion industry (Zhang et al., 2021; Papasolomou et al., 2023), while sustainability concern captures the emotional or moral importance placed on these issues (Shen et al., 2012).

Research has shown that sustainability knowledge enhances consumer ability to critically evaluate a brand's sustainability efforts (Park & Kim(b)). For instance, individuals with greater knowledge of global labour conditions, sustainable materials, and environmental impacts are more likely to form favourable attitudes toward ethically responsible brands (Pookulangara & Shephard, 2013). Shen et al. (2012) found that awareness of sweatshop practices and eco-fashion positively influenced consumer support for both socially and environmentally responsible apparel brands. In the context of CCS, knowledgeable consumers may be better equipped to assess the authenticity of a brand's sustainability claims across its economic, environmental, and social practices. As a result, the influence of CCS on brand trust, affective brand commitment, and loyalty intentions may be stronger for consumers with higher sustainability knowledge.

However, higher knowledge may also heighten scepticism in the fast fashion context. Consumers familiar with the negative environmental and social impacts of fast fashion may become more critical of greenwashing or tokenistic sustainability messaging. Thus, when CCS efforts lack perceived authenticity, sustainability knowledge may dampen the positive brand relationship outcomes.

In contrast, sustainability concern reflects a consumer's emotional investment and personal values related to ethical and responsible consumption. Shen et al. (2012) emphasised that concern for issues such as sweatshop labour and environmental degradation significantly shapes consumers' positive attitudes toward socially and environmentally responsible brands. Notably, their findings suggest that sustainability concern can be a more influential predictor of ethical purchasing behaviour than sustainability knowledge, as it taps into consumers' values and moral alignment with brand practices.

Building on this, recent research by Viet et al. (2023) further confirms that consumers with higher levels of sustainability concern are more responsive to sustainability-related information, particularly when the nature of the sustainability effort (social or environmental) aligns with their specific concern. This alignment strengthens favourable consumer evaluations, suggesting that concern serves as an important psychological amplifier of perceived sustainability initiatives. Even in cases where sustainable choices come at a personal cost such as higher costs, inconvenience etc., highly concerned consumers are more likely to make such trade-offs in favour of sustainability. When CCS initiatives are perceived as authentic, transparent, and aligned with consumer values, sustainability concern can enhance brand trust, deepen affective commitment, and strengthen brand loyalty intentions. Therefore, in this study, sustainability concern is expected to positively moderate the relationship between CCS dimensions and brand relationship outcomes.

Purpose of the paper. *The purpose of this research is to explore the impact of CCS dimensions on key brand relationship metrics within the FFI. This study aims to provide insights into how CCS initiatives can influence consumer*

behaviour and perceptions, contributing to more sustainable business practices. The conceptual framework for this research is illustrated in Fig. 1

Objectives

- *To examine the impact of customer-centric sustainability dimensions on brand trust, brand loyalty, and brand commitment in the fast fashion industry.*
- *To assess the moderating role of sustainability knowledge and concern on the relationship between CCS and brand outcomes.*

Based on this literature, the following hypotheses are proposed:

H1: Customer-centric economic sustainability positively influences: (a) brand trust, (b) affective brand commitment, and (c) brand loyalty intentions.

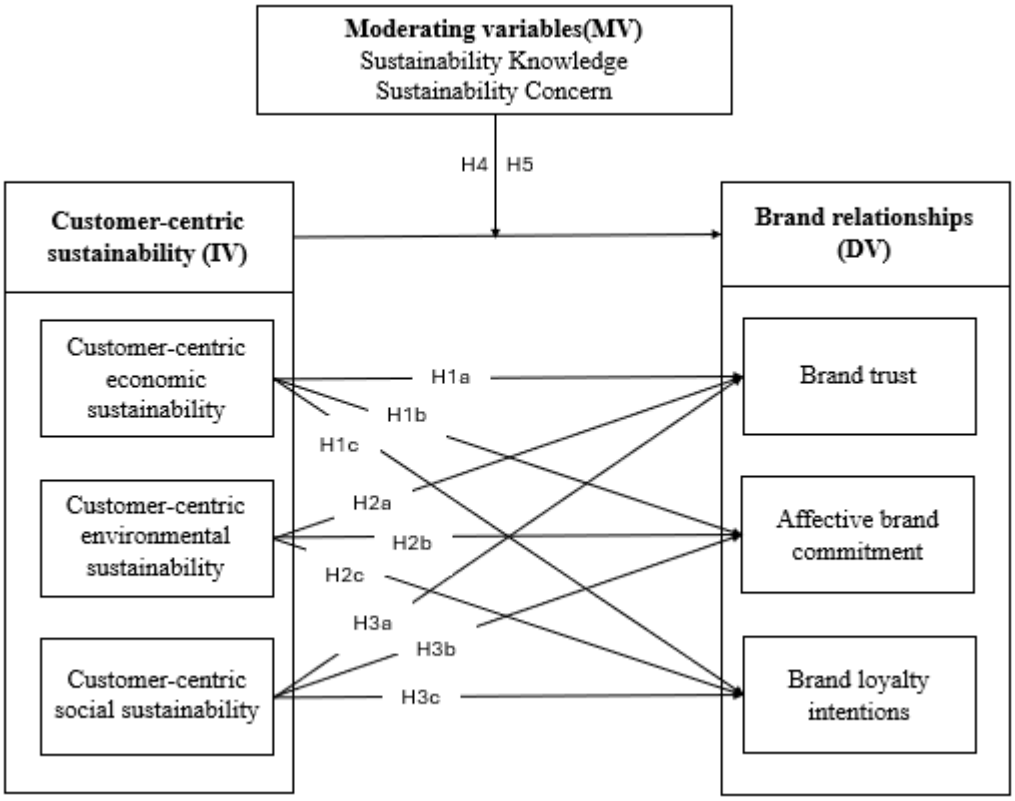
H2: Customer-centric environmental sustainability positively influences: (a) brand trust, (b) affective brand commitment, and (c) brand loyalty intentions.

H3: Customer-centric social sustainability positively influences: (a) brand trust, (b) affective brand commitment, and (c) brand loyalty intentions.

H4: Consumer sustainability knowledge strengthens the relationship between CCS dimensions (economic, environmental, and social) and brand relationship outcomes (brand trust, affective brand commitment, and loyalty intentions).

H5: Consumer sustainability concern strengthens the relationship between CCS dimensions (economic, environmental, and social) and brand relationship outcomes (brand trust, affective brand commitment, and loyalty intentions).

Fig. 1: Conceptual framework and hypothesis



Methodology.

Instrument Development

The survey instrument was designed to measure the key constructs of this study: the three dimensions of Customer-Centric Sustainability (CCS)-economic, environmental, and social-along with brand trust, affective brand commitment, brand loyalty intentions, and the moderating variables: sustainability knowledge and sustainability concern.

Respondents were required to answer 43 questions and were asked to rate the degree of their agreement. All constructs were measured using previously validated multi-item scales on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Items for CCS dimensions were adapted from Jagel et al. (2012), Lichtenstein et al. (2004), and Shen et al. (2012). The economic dimension captured product durability, comfort, style, and material quality (Jagel et al., 2012). The environmental dimension focused on the brand's use of sustainable materials and eco-friendly production practices (Jagel et al., 2012). The social dimension assessed fair wages, safe working conditions, local sourcing, and community engagement (Jagel et al., 2012; Lichtenstein et al., 2004).

The dependent variables were measured using well-consolidated and validated scales such as brand trust (Erdem and Swait, 2004), affective brand commitment (Fullerton, 2005) and brand loyalty intentions (Algesheimer et al., 2005).

The moderating variables were sustainability knowledge, using items from Shen et al. (2012) and sustainability concern, adapted from Viet et al. (2023).

Each CCS dimension and sustainability construct also included a confidence item to gauge perceived ability or awareness related to that specific area.

Tab. 1: Survey Constructs and Sources

Construct	No. of items	Source(s)
CCS economic dimension	4	Jagel et al., 2012
CCS environmental dimension	4	Jagel et al. (2012); Shen et al. (2012)
CCS social dimension	4	Jagel et al. (2012); Lichtenstein et al. (2004)
Brand trust	5	Erdem and Swait, 2004
Affective brand commitment	3	(Fullerton, 2005)
Brand loyalty intentions	3	(Algesheimer et al., 2005).
Sustainability knowledge	6	Shen et al. (2012)
Sustainability concern	6	Viet et al. (2023).

Sampling and data collection

Data are being collected through an online structured questionnaire administered via Google Forms. The survey is being distributed using a snowball sampling technique through social media platforms, university networks, and professional contacts. Participation is voluntary, and all responses are anonymous and confidential.

A brand selection filter at the beginning of the questionnaire ensures that respondents answer the items based on their most recent purchase from one of the fast fashion brands listed (e.g., H&M, Zara, Uniqlo, Zudio etc.). The target population comprises Indian fast fashion consumers aged 18 and above, primarily from the Bangalore metropolitan area, who have purchased from at least one of these brands. The survey also captures demographic details such as age, gender, and income.

Data Analysis

Data analysis will be carried out in a structured, multi-stage process to ensure methodological rigor and validity. First, Exploratory Factor Analysis (EFA) will be performed to identify the latent factor structure and evaluate item loadings, using appropriate extraction and rotation methods to optimise interpretability. Subsequently, Confirmatory Factor Analysis (CFA) will be conducted to rigorously test the measurement model, ensuring construct validity, reliability and goodness-of-fit. Finally, Structural Equation Modeling (SEM) will be implemented to empirically assess the hypothesised relationships between CCS dimensions and brand relationship variables, as well as to assess the moderating effects of sustainability knowledge and concern.

Expected outcomes. *This study expects to find that consumer perceptions of CCS-across economic, environmental, and social dimensions-positively influence brand trust, affective brand commitment, and loyalty toward fast fashion brands. It is anticipated that among these, economic and social sustainability will have a particularly strong impact on brand relationships due to their direct relevance to consumer value and ethical considerations. Environmental sustainability may have a more nuanced effect, especially where consumers question the authenticity of brand efforts. These findings would be consistent with prior research, such as Nogueira et al. (2023), which found that economic and social dimensions significantly predicted affective brand commitment and trust in fast fashion consumers.*

Moreover, consumers who are more informed about sustainability issues or who express strong concern for environmental and social well-being are expected to respond more favourably to genuine CCS efforts. These individual differences are likely to amplify the effect of sustainability perceptions on brand trust, affective commitment, and loyalty intentions.

Research limitations. *As a work-in-progress, the study is currently limited to the Indian market, which may affect generalisability to other cultural or economic contexts. While the sample is diverse in age and income, it is limited to consumers who actively shop at fast fashion brands, potentially excluding highly sustainability-conscious non-users. The reliance on self-reported data may also introduce social desirability bias, especially concerning sustainability attitudes. Additionally, while the proposed SEM approach allows for robust model testing, longitudinal data would be better suited to assess causal relationships over time. A future phase of this research could include a cross-cultural comparative analysis (e.g., India vs. a developed market like Italy) to enrich the findings.*

Managerial implications. *This study offers fast fashion managers strategic guidance on leveraging sustainability to strengthen consumer-brand relationships. By adopting a CCS approach, brands can move beyond surface-level claims and better align their efforts with consumer expectations around transparency, product quality, and ethical responsibility. The findings are expected to help managers identify which dimensions of CCS-economic, environmental, or social-*

resonate most with their target audience. Additionally, authentic sustainability practices can foster deeper emotional engagement and brand trust, particularly among consumers with higher sustainability awareness. Tailoring sustainability communications to reflect these concerns can further enhance relevance and credibility. Ultimately, CCS-driven strategies can help brands build long-term consumer loyalty that extends beyond price sensitivity and trend-driven purchasing.

Originality of the paper. *This paper contributes to the growing intersection of sustainability marketing and brand relationship literature by applying the CCS framework to the FFI-a sector often criticised for its unsustainable practices. Unlike traditional CSR research, which centres on corporate responsibility, this study shifts the lens to how consumers perceive and respond to sustainability practices. It further adds novelty by examining the moderating roles of sustainability knowledge and concern-two increasingly important factors in consumer behaviour research. By focusing on India, the study provides insights from a complex and rapidly evolving consumer market where affordability often drives purchase decisions. Moreover, India represents a context that disproportionately bears the environmental and social costs of fast fashion production, making its inclusion particularly salient in global sustainability conversations. As such, the study not only advances theoretical understanding but also offers culturally and economically relevant implications for practice.*

Keywords: *Customer-centric sustainability; fast fashion; brand trust; affective brand commitment; brand loyalty intentions; sustainability knowledge; sustainability concern*

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Towards a sustainable present: strategies and innovation for food sustainability

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Abstract

Sustainability is a very overused topic nowadays: however, it is undeniable how it is an essential concept to allow a correct green transition in the awareness of having a correct approach to managing the planet, a management that is able to account for all relevant issues in a holistic way.

Starting from the assumption of considering environmental, economic and social issues at the same time, it must be immediately clarified that the Food sector is one of the most impactful both in terms of direct impacts -that in a life cycle perspective it is able to cause- but also in indirect terms as it is intimately connected to the lifestyles and diets of each of us: all this considered, this sector must permeate with innovative strategies in terms of sustainability that allow it to escape from the negative spiral and be able to represent a point of reference for other sectors.

Solutions such as more efficient cultivation techniques, water saving strategies, enhancement of less impactful products, development of agroecological infrastructures, green packaging, sustainability labelling, sustainable supply chains are essential to allow a radical change in a sector that is strongly in need of change.

Framing of the research. *The framing of the research is based on a holistic approach, considering all stages of the food product's life cycle - from production to distribution, from consumption to disposal - and analyzing the most advanced solutions in terms of green innovation. Key elements such as more efficient cultivation techniques, water-saving strategies, enhancement of low-impact products, agroecological infrastructures, sustainable packaging, eco-labeling, and responsible supply chains will be studied to identify best practices and the most effective models.*

The objective of the research is therefore to outline a clear and detailed framework of the strategies currently available and their future potential, identifying replicable and scalable solutions that can serve as a benchmark for the entire food sector, thus contributing to a concrete and effective sustainable transition.

The food sector is currently at the center of a transformation aimed at combining innovation, efficiency, and sustainability. To ensure a green transition and a resilient food system, a comprehensive regulatory framework has been implemented both at the European and Italian levels, covering the entire supply chain: from production to consumption, from resource management to waste reduction.

The principle of healthy and proper nutrition is related to seven of the seventeen Sustainable Development Goals (SDGs) of the United Nations' 2030 Agenda. Summarizing the concept, the possible contributions of sustainable nutrition to the SDGs essentially concern two main areas: individual and collective health and well-being on one hand, and environmental sustainability on the other. A recent report by The European House Ambrosetti[3] highlights that malnutrition affects 821 million people, while nearly 2 billion people are overweight or obese. Deaths caused by obesity amount to approximately 30 million per year, while those due to malnutrition are around 35 million. These issues are closely linked, as various studies[4], particularly in developing countries, show that childhood malnutrition can be a

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[3] "The (R)evolution of Sustainability in the Italian Agri-Food Supply Chain" is the title of the report by The European House Ambrosetti and Ambrosetti Club, two of the leading think tanks specializing in business analysis and consultancy in Italy. Presented at the Food & Beverage Forum in June 2023, the research focuses on the sustainable and circular transition of the Italian agri-food supply chain. According to the Ambrosetti report, the cornerstone of the path toward sustainability must be the United Nations' 2030 Agenda: as many as 11 out of the 17 Sustainable Development Goals (SDGs) involve the agri-food sector. This includes key issues such as the right to access healthy food, as well as the fight against hunger, malnutrition, and undernourishment. At the European level, the main reference points are the Farm to Fork and Biodiversity strategies, which help set concrete and measurable objectives. These include, for example, reducing pesticide use by 50% and fertilizer use by 20% by 2050, as well as ensuring that 25% of cultivated land is dedicated to organic farming-a goal in which Italy is already making significant progress.

[4] Joint press released by EU/FAO/IFAD/UNHCR/UNICEF/WB/WFP. As reported in the latest Global Report on Food Crises (GRFC), approximately 282 million people across 59 countries and territories suffered from acute hunger in 2023-marking a global increase of 24 million compared to the previous year. This rise is attributed to the expansion of crisis-affected areas analyzed in the report and the severe deterioration of food security, particularly in Gaza Strip and Sudan. For the fourth consecutive year, the percentage of people experiencing acute food insecurity has remained alarmingly high-around 22 percent-far exceeding pre-COVID levels. As the report highlights, children and women are at the forefront of food crises, with over 36 million children under

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predictive factor for obesity in adulthood. Moreover, the number of malnourished people has been rising again since 2015, despite the continuous increase in global food production-clear evidence of the dramatic scale of food waste.

In its strategy for food sustainability, the European Union has set the goal of protecting the environment and ensuring healthy nutrition for all while supporting producers. This is based on the recognition that the food system-from production to consumption and waste-has a significant impact on the environment, health, and food security.

On May 20, 2020, the European Commission presented the "Farm to Fork" strategy[5]*, aiming to build a sustainable food system to safeguard food security and protect both European citizens and nature.*

Essentially, this strategy serves as a regulatory framework for a series of laws that the European Commission will propose across various areas, including the revision of pesticide legislation, new animal welfare regulations, measures against food waste and food labeling fraud, and the reform of the EU agricultural system.

The key targets of the strategy for 2030 include reducing the use and risk of chemical pesticides by 50%, cutting fertilizer use by at least 20%, decreasing antimicrobial sales for livestock and aquaculture by 50%, and allocating at least 25% of agricultural land to organic farming.

Compared to achievements so far, Europe's agricultural sector is the only one in the world to have reduced greenhouse gas emissions, achieving a 20% drop compared to 1990 levels. However, as noted in a European Parliament statement, "the sector still accounts for about 10% of emissions, with 70% of these caused by livestock farming. The production, processing, packaging, and transportation of food products remain major contributors to climate change."

The strategy is part of the European Green Deal and aligns with the new EU Biodiversity Strategy for 2030 and the reform of the Common Agricultural Policy (CAP). The ultimate goal of the "Farm to Fork" strategy is to achieve climate neutrality in the EU by 2050.

Regarding Italy, the 2024 edition of the Istat Report on Sustainable Development Goals[6] *provides an overview of Italy's relationship with food sustainability, which is closely linked to SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production). The report highlights significant progress in reducing food waste, thanks to awareness campaigns and food recovery initiatives. The adoption of sustainable agricultural practices, such as organic farming and precision technologies to reduce pesticide and fertilizer use, is also increasing. Additionally, there is growing awareness and adoption of sustainable diets, with a rise in the consumption of low-impact foods such as fruits, vegetables, and legumes. However, significant regional disparities persist in access to sustainable agricultural practices and food waste reduction. Some agricultural sectors remain resistant to adopting new technologies and sustainable practices, slowing overall progress. Finally, climate change continues to pose a challenge, negatively impacting agricultural production and food security.*

Purpose of the paper. *The 'work-in-progress' research project aims to carry out a detailed and precise review of innovative strategies in the Food & Beverage sector that can represent a real driving force for the sustainable transition in this sector.*

The idea is to investigate green innovations in all phases of the life cycle of the food product by evaluating approaches, purposes and results obtained (or expected) in the sphere of sustainability (therefore also from a social perspective, for example, environmental).

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the age of five suffering from acute malnutrition in 32 countries. In 2023, acute malnutrition worsened, especially among people displaced due to armed conflicts and natural disasters. The Global Network Against Food Crises (GNAFC) calls for an urgent transformative approach that integrates peacebuilding, prevention, and development interventions with large-scale emergency efforts to break the cycle of acute hunger, which remains persistently and unacceptably high. "This crisis demands immediate action: it is essential to use the report's data to transform food systems and address the root causes of food insecurity and malnutrition", said António Guterres, Secretary-General of the United Nations.

[5] The Farm to Fork Strategy is at the heart of the European Green Deal aiming to make food systems fair, healthy and environmentally-friendly. Food systems cannot be resilient to crises such as the COVID-19 pandemic if they are not sustainable. We need to redesign our food systems which today account for nearly one-third of global GHG emissions, consume large amounts of natural resources, result in biodiversity loss and negative health impacts (due to both under- and over-nutrition) and do not allow fair economic returns and livelihoods for all actors, in particular for primary producers. Putting our food systems on a sustainable path also brings new opportunities for operators in the food value chain. New technologies and scientific discoveries, combined with increasing public awareness and demand for sustainable food, will benefit all stakeholders. The Farm to Fork Strategy aims to accelerate our transition to a sustainable food system that should: have a neutral or positive environmental impact, help to mitigate climate change and adapt to its impacts, reverse the loss of biodiversity, ensure food security, nutrition and public health, making sure that everyone has access to sufficient, safe, nutritious, sustainable food. The strategy sets out both regulatory and non-regulatory initiatives, with the common agricultural and fisheries policies as key tools to support a just transition. A proposal for a legislative framework for sustainable food systems will be put forward to support implementation of the strategy and development of sustainable food policy. Taking stock of learning from the COVID-19 pandemic, the Commission will also develop a contingency plan for ensuring food supply and food security. The EU will support the global transition to sustainable agri-food systems through its trade policies and international cooperation instruments.

[6] On July 4, 2024, Istat presented the seventh edition of the Report on the Sustainable Development Goals (SDGs), adopted with the 2030 Agenda by the United Nations General Assembly. The 17 goals and their respective targets balance the three dimensions of sustainable development, extending the 2030 Agenda from the social pillar to the economic and environmental ones, with the addition of the institutional dimension. In the SDGs 2024 Report, 373 statistical measures are provided for 139 indicators proposed by the United Nations Inter-Agency Expert Group on SDG Indicators (UN IAEG-SDGs).

The study of these new solutions can act as a driving force for other activities and other sectors and can lead other players to adopt or improve them with a view to continuous improvement. When we talk about analysis of techniques from a cradle to grave perspective, we are referring to an approach where all the strategic innovations are considered from the field (and/or the farm) to the treatment of food waste and its possible packaging, starting from the awareness that it is important to act in every phase where it is possible to obtain an improvement: in this sense efficient cultivation techniques, water saving strategies, enhancement of less impactful products, development of agroecological infrastructures, green packaging, sustainability labelling, sustainable supply chain amongst the others will be evaluated.

Methodology. *From a methodological point of view, a qualitative approach was chosen: in fact, it was decided to undertake a review of the existing literature in the technical-scientific field that includes the most recent and innovative sustainability strategies in the Food & Beverage sector: specifically, a recent time limit allows to only count the newest solutions that logically can be more or less tested depending on the level of technical maturity that characterizes them.*

Another point to be remarked is surely that one of research perimeter: the techniques under the lens are those ones that characterize all the phase of the life cycle of a food product in a 'from cradle to grave' perspective' not focusing for example only on packaging or cultivation techniques but taking into account also other considerations as labelling, supply chains etc.

Results. *As for the expected results, what is expected is the highlighting of innovative techniques and strategies that can take on the role of best practices in the Food sector, giving rise to a real sustainable revolution in this area which, as mentioned, is one of the most impactful in this sense.*

The innovations will have to concern numerous aspects, following all the phases characterizing the life of the food product, starting from how the product is born (cultivation or breeding) to move on to packaging, its transport and its use, to its disposal. As anticipated, the idea is to create a compendium containing the best in terms of sustainable innovation that becomes a point of reference from which to draw inspiration in terms of imitation or a basis from which to develop new ideas.

Research limitations. *The scope of the research includes the various innovative strategies capable of increasing the level of sustainability within the agri-food sector by considering the various hypothetical phases of a product's life cycle in a holistic perspective from the cradle to the grave (production phase, processing phase, transport and distribution, use, packaging and end of life) focusing on the last years of strategic development.*

It should be clarified that the research does not aim to review all the innovations on the market but places the emphasis on those of greatest interest, most successful, most tested and most capable of having an impact on the sustainability of the sector; this will naturally lead to excluding strategies that may prove noteworthy in the future and that will certainly be taken into consideration in a future update.

Managerial implications. *The following research project is closely connected to several managerial implications: specifically, reviewing in great detail the technical solutions capable of increasing the level of sustainability of the agri-food sector can bring out positive trends capable of representing a path to follow for other players who will be able to exploit the innovations to adapt and consequently increase their level of sustainability; furthermore, sharing innovative practices can stimulate technological creativity by triggering processes of continuous improvement of the same strategies.*

Ultimately, the logic of the project provides a strong link between sharing ideas, imitation mechanisms and improvement, all with the ultimate goal of environmental, economic and social sustainability.

Originality of the paper. *The paper tries to find out and underline innovative strategies in the Food & Beverage sector that can represent the compass to follow for the sustainable transition in this sector.*

The strong point is the fact that the investigation related to green innovations concerns all phases of the life cycle of the food product and it develops by analyzing approaches, purposes and results obtained (or expected) in the holistic sphere of sustainability (economic, environmental, social, governance).

The study of these new sustainable solutions can act as a driving force for other activities and also for other sectors and can lead other players to adopt or ameliorate them with a view to continuous improvement.

Key words: *food; sustainability; innovation; sustainable transition; green strategies; sustainable development*

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Analysis of three sustainability labels in the Food&Beverage sector

MAXIMILIAN BROGLIO[1]

Abstract

In a global context increasingly characterized by the overcoming of numerous planetary boundaries, humanity has reached the tipping point for numerous areas of interest, just think of climate change (the United Nations intergovernmental panel on climate change IPCC has already warned[2] that the food industry alone already contributes up to 37% of global greenhouse gases and that, without intervention, these are likely to increase by another 30% by 2050, due to the growing demand resulting from population growth), the impressive rates of extinction of numerous species[3] or biogeochemical pollution of anthropogenic origin; furthermore, the senseless and indiscriminate use of non-renewable resources and the unsustainable use of renewable ones (i.e. without waiting for natural regeneration rates) are necessarily moving various sectors to change course, aware that the time factor will be fundamental to counteract the overshoots mentioned above.

The food industry is a key player for sustainable development and for containing the overshooting of planetary limits, which is why various solutions have been created and are being developed to make it less impactful: one with great potential is certainly that of "ecoscores", i.e. science-based sustainability scores applied by means of a label to the final product in order to allow consumers to make informed and sustainable choices.

The ongoing research project ("work-in-progress") will provide an overview of some of the most tested "ecoscores" (Eco-score® by ADEME[4] which since December 2024 has been renamed Green-score®, Planet-score® by ITAB[5], Eco impact® by Foundation Earth[6]) highlighting their characteristics, peculiarities, gaps and differences (through a comparative analysis) and carrying out analyses on how they are perceived by both consumers and experts.

Framing of the research. *The research tries to give an in-depth and complete overview in a field that is currently fragmented and poorly harmonized (there is a clear research gap in literature), aware of the potential impact that this tool has to offer especially when a single and harmonized label will be actually achieved.*

The primary objective of the project is precisely that of clarifying, explaining and investigating food sustainability starting from the assumption that the real fundamental player is the consumer: making him aware, informing him in a clear and transparent manner is the only way to take the path of food sustainability; in fact, by being able to choose sustainable foods, the consumer indirectly forces producers and all players in the food supply chain to align themselves with the most sustainable competitors, under penalty of inevitable exclusion from the market.

This project is fundamental given the growing "ESG awareness" of the average consumer who increasingly demands products that are sustainable from an ethical, social and environmental point of view and this fits perfectly into the tracks of the European "Farm to Fork" strategy and the recent theme «Towards a framework for sustainability labelling of food products that enables consumers to make sustainable food choices».

As anticipated in order to guarantee a scientific approach all the labels considered are science-based and in particular they refer to the Life Cycle Assessment methodology: «an objective process of assessing the environmental burdens associated with a product, process or activity, conducted through the identification and quantification of energy and materials used and waste released into the environment, to assess the impact of these uses of energy and materials and releases into the environment, and to assess and implement opportunities for environmental improvement»[7].

Purpose of the paper. *The research question naturally arises from a gap in the literature and falls within the phase of defining cognitive objectives; it can be framed by the statement "Exploring the world of sustainability labels (Ecoscores) in the Food sector in Europe" from which sub-questions depend in a cascade such as "What are the most convincing sustainability labels in the UE Food sector?", "What are the points of contact and the differences between the various labels?, "What are the reasons behind their creation?", "How are they perceived by consumers?", "How*

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2 IPCC (2019), *Special Report on climate change and land (SRCCL).*

3 WWF (2021), *Estinzioni: non mandiamo il pianeta in rosso.*

4 French Agency for Ecological Transition

5 French Technical Institute of Organic Agriculture.

6 UK independent non-profit organization created to issue environmental scores to be displayed via front-of-pack labels on food products.

7 SETAC- Society of Environmental Toxicology and Chemistry (1993).

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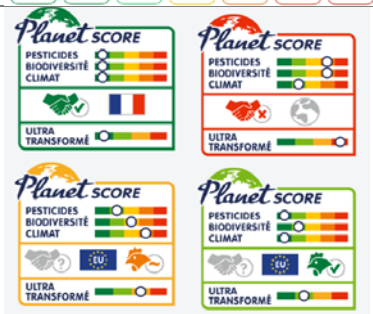
are they perceived by producers?", "How are they perceived by a panel of experts? "How are they framed at policy level?"

The research question therefore develops in the identification of the most convincing European sustainability labels in the Food sector, in their comparative analysis and in the evaluation of their impact on different targets such as consumers, producers and experts without neglecting a dutiful reference to their framing at policy level.

A fundamental concept related to the final aim of this research project is harmonization: different labels born in different contexts and with different technical-methodological backgrounds are certainly resources for the heterogeneity of ideas but can lead to problems in terms of confusion for the end user or the consumer who is the true driving force for sustainable change in the agri-food system; the hope is for a single and harmonized label at European level that is able to capture the best (without excluding any issue such as pesticides, biodiversity, farming methods, social side, etc.) from the various experiences born so far and in which any differences in alignment with the reality of environmental modeling of impacts are not influential in a context that has as its objective the highlighting of differences at a relative level.

Tab.1 : Sustainability labels under analysis for the Food&Beverage sector

Green-score® (ex Eco-score®)	
Planet-score®	
Eco impact®	

Source: author's elaboration

Methodology. *From a methodological point of view, the approach used is both qualitative and quantitative.*

The first part of the project is based on a combination of a systematic review of the literature on "ecoscores" in the Food & Beverage sector and an in-depth and comparative analysis of the technical and methodological material provided by the label owners, setting the European territory as the reference perimeter.

The next analyses will instead be based on a more quantitative approach, using different types of statistical surveys to analyze the impact of the labels on the different players involved and specifically focus group and online surveys will be exploited for the consumer perception analysis while Delphi methodology will be linked to the collection of experts perception.

Results. *So far two activities have been completed: the review of the technical material provided by label owners and of the literature related to sustainability labels in the Food sector that led indeed to the identification and analysis of the three most convincing and tested labels in the European territory already mentioned with the creation of a sort of compendium containing all the technical material; then the detailed comparative analysis of the various labels with identification of points of contact, and gaps with the ultimate goal of extrapolating the best of the various experiences with a view to harmonization: thanks to the detailed comparative analysis of the various labels, similarities, differences, gaps were highlighted, creating an interesting information pool for future choices in the field of policy (especially with a view to a single harmonized label at European level).*

At present, it is believed that the work carried out by Planet-score® is the most complete in terms of coverage of environmental issues updated with the problems related to overcoming planetary limits; it should also be added that

labels too aligned with the PEF[8] are consequently entangled in the gaps and critical issues of the system and also recently reiterated by the European Union, in the Green Claims directive, where it was decided not to make the PEF the sole methodological framework of reference for food products due to its inability to take into account some particularities of food production, such as positive externalities on the environment or reproduction conditions.

In general, it is concluded by asserting that sustainability labels in the food sector can be truly powerful tools in the hands of policy makers and producers but that the real levers of change will be correctly informed and aware consumers.

For future research it will be interesting evaluate the direct opinion of different targets faced with the comparison of these different labels.

Research limitations. *LCA is the basis of the three labels analyzed.: the labels, however, do not stop at an analysis simply based on LCA but intervene by adding complementary indicators capable of accounting for issues that LCA in the agri-food sector, due to its current immaturity, is not able to consider. In some cases, the impact derived from LCA is paradoxically greater for the most sustainable methods (for example organic eggs) and instead is lower for the less sustainable ones (for example eggs from caged hens) demonstrating how the LCA studies specific to agri-food are still too unreliable making them difficult to use for any information and awareness-raising activity. This is easily explained by the dichotomy between "intensification" and "extensivation": as regards agri-food products, the LCA score (of French database Agribalyse for example) essentially measures the degree of intensification of practices without accounting for fundamental factors to guarantee sustainability in a holistic sense. What is clear is that the LCA without corrections (carried out by all three labels although in different ways) tends, in spite of itself, to favor intensive agriculture (characterized by better yields) and penalizes extensive or organic systems, all without accounting for negative environmental impacts such as those related to pesticides and antibiotics, problems linked to the collapse of biodiversity, impacts on soil quality, positive externalities provided by some production systems (agro-ecological infrastructures, biodiversity, carbon storage, etc.), effects of thresholds and saturation at local scales.*

To seal the issue of the inadequacy of LCA in the food sector, the Green Claims Directive published by the European Commission on 22 March 2023 and voted by the EU Parliament on 12 March 2024, also recognizes the impossibility of imposing a single reference method, in particular due to the numerous blind spots in the LCA method, especially for agriculture, fisheries and textiles: specifically, the EU has given up on making PEF (a tool largely based on LCA) the single methodological reference framework for food products, due to its inability to take into account some particularities of food production, such as positive externalities on the environment or on reproduction conditions, for example (with the paradoxical risk of causing inconsistencies with public policies in favor of the ecological transition of agriculture as well as communicating something profoundly incorrect).

Another issue to reflect on is certainly the general lack of the social side in labels: sustainability, as has been repeatedly reiterated, must be conceived in all its components and the social sphere cannot be excluded; Planet-score® with its full version by inserting the evaluation of the fair remuneration of producers on the label has taken a first step but this side of sustainability certainly deserves more space.

The last limitation is linked to the research perimeter: the analysis focused only on the European perimeter but it will be compelling to extend the analysis worldwide.

Managerial implications. *The results of the research project could induce a chain reaction with the ultimate goal of achieving the goal of food sustainability: in detail, the work could represent a systematized starting point so that policy makers can reach the definition of an optimized and above all harmonized, credible and science-based tool that can allow the final consumer, the real decisive player to actually achieve sustainability, to make conscious, reasoned and sustainable choices, also forcing the less virtuous producers to align themselves with the more sustainable competitors.*

Originality of the paper. *The work represents an important opportunity to compare three sustainability labels in the food sector in the awareness of their great potential both for policy makers and final consumers.*

The work is interesting and particular because it focuses both on a detailed comparative analysis of the three labels but also on the extended evaluation of how they are perceived by various targets with the final aim of providing valuable information to consumers and policy makers.

Key words: *Sustainability score; front-of-pack labels; Food&Beverage; ecoscore; sustainable development*

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[8] Product Environmental Footprint

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Shaping Circular Economy Ecosystems: Foundations for a Framework

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Abstract.

The Circular Economy (CE) reconfigures business systems to integrate economic, environmental, and social objectives through multi-stakeholder collaboration (Sönnichsen et al., 2024; Geissdoerfer et al., 2017). Although Circular Business Models (CBMs) embed these principles at the firm level, their broader impact is curtailed, with circular practices comprising just 8.7% of global economic activity (Fehrer et al., 2024). This limitation arises from an overemphasis on isolated firm strategies rather than interdependent ecosystem dynamics. Circular Economy Ecosystems (CEEs) offer a systemic lens, uniting actors-businesses, policymakers, academia and communities-to co-produce value (Pietrulla, 2022; Kanda et al., 2021). Yet, the social dimension of CEEs remains underexplored, limiting insight into their societal potential. This qualitative study, blending a systematic literature review with a case analysis of Manteco-a leader in circular textiles-proposes a multidimensional framework synthesizing environmental, economic and social facets of CEEs. Results reveal governance structures, stakeholder interactions and social value mechanisms, providing theoretical clarity and managerial strategies for advancing circularity.

Framing of the research. *The concept of the Circular Economy (CE) has gained increasing attention among scholars, industry practitioners and policymakers (Zucchella & Previtali, 2019; Pietrulla, 2022; Kanda et al., 2021; Pieroni et al., 2019). Recognized as a key enabler of sustainability, CE seeks to harmonize economic activities with environmental and social imperatives (Fehrer et al., 2024; Boldrini & Antheaume, 2021; Geissdoerfer et al., 2017). It is defined as "a regenerative economic system that requires a paradigm shift to replace the 'end-of-life' concept with the reduction, alternative reuse, recycling and recovery of materials throughout the supply chain, with the aim of promoting value preservation and sustainable development, enabled by an alliance of stakeholders as industry, consumers, policymakers, and academia" (Sönnichsen et al., 2024). This paradigm shifts challenges traditional business models and supply chain dynamics, requiring systemic transformation.*

At the firm level, Circular Business Models (CBMs) represent a key mechanism for embedding circular principles into corporate strategies. CBMs integrate economic, environmental and social dimensions into their value proposition (Boons & Lüdeke-Freund, 2013), enhancing resource efficiency, minimizing waste and ensuring value retention (Guldmann & Huulgaard, 2020; Geissdoerfer et al., 2020, 2023; Bocken & Ritala, 2021). However, despite the increasing adoption of CBMs, their overall impact remains constrained, with only 8.7% of the global economy currently operating under circular principles (Fehrer et al., 2024). The persistence of firm-centric perspectives, which focus narrowly on individual business operations rather than systemic interactions, restricts the scalability of circular initiatives. Given that firms operate within complex, multi-stakeholder networks spanning industries, supply chains and regulatory environments (Kanda et al., 2021), the transition to circularity necessitates a shift toward an ecosystemic perspective (Fehrer et al., 2024; Konietzko et al., 2020; Tabas et al., 2024; Trevisan et al., 2022).

Recent scholars have increasingly explored the intersection of CE and business ecosystems (BE), leading to the conceptualization of Circular Economy Ecosystems (CEEs) as a framework for understanding stakeholder interdependencies in resource circularity. CEEs are defined as "multi-actor entities in which interdependent actors play complementary roles, including companies, industry representatives, public and government agencies, ministries, universities, non-profit organizations, and citizen-consumers" (Pietrulla, 2022). This approach marks a shift from isolated corporate strategies to dynamic, interconnected ecosystems in which actors collaboratively create economic, environmental and social value (Kanda et al., 2021; Trevisan et al., 2022; Fehrer et al., 2024).

CEEs integrate several key dimensions, including governance, value creation, actor interactions, data and material flows and circular strategies (Asgari & Asgari, 2021). Among these, governance plays a pivotal role in ensuring coordination, strategic alignment and transparency (Pietrulla, 2022). Governance models within CEEs exhibit significant variation, ranging from centralized structures, where a dominant focal actor orchestrates collaboration, to decentralized

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models relying on third-party coordination. The heterogeneity of governance arrangements underscores the need for adaptive frameworks that reflect the specific characteristics of each CEE (Pietrulla, 2022).

The role of the orchestrator is particularly critical in managing the complexity of CEEs. Orchestrators facilitate knowledge management, set operational standards and develop contractual frameworks that optimize resource circularity (Zucchella & Previtali, 2019; Pietrulla, 2022). Beyond these technical functions, they foster collaboration, encourage resource-sharing practices and enable service co-creation, balancing individual firm objectives with broader ecosystemic goals (Zucchella & Previtali, 2019). Moreover, orchestrators continuously assess ecosystem evolution, identifying new entrants, redefining stakeholder roles and recalibrating governance structures to enhance circular outcomes (Trevisan et al., 2022). Through these mechanisms, orchestrators leverage resources to strengthen CEEs, foster innovation and facilitate stakeholder cooperation, thereby advancing large-scale circular transitions (Fehrer et al., 2024; Pietrulla, 2022; Zucchella & Previtali, 2019).

While the literature increasingly acknowledges the strategic role of CEEs in fostering circularity (Aminoff et al., 2017; Hsieh et al., 2017; Parida & Wincent, 2019), there is a lack of conceptual clarity regarding the defining characteristics of CEEs and their unique attributes. Existing definitions (Aminoff et al., 2017; Wurster et al., 2020) recognize the co-evolutionary nature of these ecosystems but fail to explicitly connect ecosystem outputs with circular value propositions. Furthermore, the indiscriminate use of the term 'ecosystem' without a precise delineation of its constitutive elements constrains both theoretical advancements and managerial applications.

Trevisan et al. (2022) contribute to addressing these gaps by introducing an integrative framework that synthesizes five foundational dimensions of CEEs: (1) value creation and appropriation, (2) actor configuration and interrelations, (3) data, materials, and resource flows, (4) circular strategies and activities, and (5) governance structures. This framework offers a first theoretical foundation for analyzing the multifaceted nature of CEEs and their role in enabling systemic circularity. Authors highlight the need to investigate the social aspects of a circular ecosystem as well as the environmental and economic ones.

Purpose of the paper. *Despite the expanding literature on Circular Economy Ecosystems (CEEs), their social dimensions remain insufficiently examined. Current research provides only partial perspectives on how CEEs generate social value, leaving a critical gap in understanding their broader societal contributions. Staicu (2019) underscores the significance of social entrepreneurship in CEEs, proposing that scaling circular business models can amplify their social impact. Likewise, Parida et al. (2019) argue that circular economy scholarship must extend beyond its predominant focus on environmental and economic outcomes to encompass social benefits, such as community well-being and resilience. A thorough investigation into the social dynamics of CEEs is imperative, particularly given their capacity to stimulate community participation, generate employment, and strengthen social cohesion.*

Addressing the research agenda outlined by Trevisan et al. (2022), this study develops a holistic framework that synthesizes the environmental and economic pillars of CEEs with their underexplored social dimension. By integrating these elements, the proposed framework offers robust theoretical contributions and actionable insights for academics and practitioners advancing circular economy initiatives.

Methodology. *This study employs a qualitative methodology, integrating a single case study with a systematic literature review to investigate the structure and social dynamics of Circular Economy Ecosystems (CEEs). The systematic literature review, conducted per Tranfield et al. (2003), synthesized existing CEE scholarship (e.g., Trevisan et al., 2022; Pietrulla, 2022; Staicu, 2019) to establish a theoretical foundation and identify research gaps, particularly the underexplored social dimension. This review shaped the case study's focus by deriving key areas for inquiry-namely, stakeholder roles, governance mechanisms, and social value creation-which informed the design of interview questions and the selection of focal points for data collection.*

A single case study approach was selected for its suitability in exploring novel, complex phenomena within their real-world contexts (Yin, 2009; Eisenhardt, 1989), offering depth into Manteco, a globally recognized leader in sustainable textiles based in Prato, Italy. Manteco's pioneering role in circular wool recycling since 1943 and its ecosystem engagement made it an exemplary case for examining CEE dynamics. Data collection unfolded in two phases. Initially, secondary data from sustainability reports, news articles, and Manteco's website provided a contextual baseline of its circular practices and stakeholder interactions. Subsequently, primary data were gathered through semi-structured interviews with Dr. Giuseppe Picerno, Head of Innovation and Sustainability, and Dr. Luca Querci, Special Project Manager. These interviews, guided by literature-derived themes, probed stakeholder contributions, governance structures, and social impact mechanisms, such as the Manteco Academy's role in community engagement.

Data analysis utilized an inductive thematic coding process, following Gioia et al. (2013), to distill patterns and mechanisms from both secondary and primary sources, ensuring findings were empirically grounded and aligned with the literature's conceptual framework

Results: ***Manteco's CEE.***

According to Trevisan et al. (2022), Manteco's CEE is based on the integration of the five core elements.

Value*: Manteco's value proposition revolves mainly around its commitment to sustainability, circularity, and the creation of high-quality fabrics. Over the years, Manteco has positioned itself as a leader in sustainable fashion, crafting luxury fabrics from recycled wool. The company's value proposition is anchored in four key pillars: Circularity, Durability, Made in Italy, and Recyclability. This value proposition appeals to various stakeholders, including customers, suppliers, and institutions, who share in the collective value creation within Manteco's ecosystem.*

Manteco places a strong emphasis on value co-creation, particularly through its collaborative relationships with suppliers and customers. The company operates a recycling supply chain where partners work together to recycle textile fibers, helping close the loop on material use. The company's continuous efforts to refine its circular economy model include increased transparency and communication around the environmental benefits of its practices. However, Manteco acknowledges the need for further development of textile fiber recycling systems to fully realize the potential for value co-creation within the ecosystem.

Manteco actively co-creates social value, with the Manteco Academy, established in 2018, representing its flagship initiative in this endeavor. The Academy was designed to educate and engage students worldwide on topics related to circular economy, sustainability, and eco-designed fabrics. Its mission is to provide the next generation of designers and fashion professionals with the necessary tools to create sustainable, circular products. Through guided visits, lectures, webinars and an informative company blog, the Manteco Academy empowers students to integrate sustainability principles into their future design practices.

In addition to educational initiatives, Manteco actively fosters creativity and innovation in sustainable fashion through collaborations with academic institutions and fashion schools. The company offers its materials for fashion competitions and hosts the Manteco Sustainability Award, a competition aimed at students who wish to develop capsule collections that adhere to the company's eco-design principles. This initiative allows students to apply their knowledge of circular economy and sustainability in a real-world context, fostering practical skill-building and innovation.

Through these initiatives, Manteco has established collaborations with approximately 40 partners, including fashion schools and universities, reinforcing the company's role as a key enabler in the education and development of sustainable practices within the fashion industry. Furthermore, Manteco's engagement extends beyond education, leveraging social media platforms to raise awareness among end users about sustainability issues and circular economy principles. By using these platforms, the company promotes its sustainable initiatives and encourages greater participation in circular practices among consumers.

The Manteco Academy represents a dual approach to social value creation: both as an educational platform and as a means to actively engage the broader community in circular economy principles. As Dr. Luca Querci, Special Project Manager at Manteco, states, "The fundamental pillars of Manteco Academy are both educational and competitive. The company organizes guided visits, seminars at schools and universities to discuss products and sustainability projects, and has introduced the Manteco Sustainability Award." Through these efforts, Manteco demonstrates its commitment to fostering a more sustainable and socially responsible future in the fashion industry.

Actors: *Manteco's ecosystem consists of a connected set of actors, each fulfilling a critical function in value creation and circular operations. The company establishes long-term relationships with key suppliers, ensuring a stable procurement process in which a significant proportion of costs is allocated to reliable partners. Subcontractors contribute to production continuity, while customers play an active role in the co-development of products and services, facilitating customization and market adaptability.*

Beyond its direct supply chain, Manteco engages with a network of institutions, including universities, research centers, NGOs and industry associations. Notable collaborations include participation in working groups within the Ellen MacArthur Foundation and strategic partnerships with institutions such as SDA Bocconi in the field of circular fashion. These alliances serve as drivers of innovation and enable stakeholder alignment, ensuring that all actors within the ecosystem adhere to Manteco's sustainability principles.

Additionally, the Manteco System, a network of affiliated companies, operates under a shared Values Charter, reinforcing collective adherence to circular and responsible business practices. Through this structured network, Manteco facilitates coordinated action, which is essential for scaling circular models and advancing innovation in textile recycling.

Data, Materials and Flows*: In Manteco's circular economy ecosystem, resource integration plays a fundamental role in ensuring sustainability. The company incorporates recycled wool and other sustainable materials into its production processes, embedding material flows at the core of its business model. A key focus is the exchange and recirculation of resources among various actors, including suppliers and customers, to maximize the repurposing and reuse of materials and minimize waste generation.*

Data integration is equally critical in optimizing material flows and enhancing process efficiency. By leveraging advanced technologies, Manteco increases supply chain transparency, enabling real-time monitoring of material movements. The company is also expanding its use of digital tools to facilitate data exchange and improve the coordination of actors within the ecosystem. This approach enhances resource circulation, reduces dependency on virgin materials, and supports the broader transition to a circular economy.

Circular Activities and Strategies: Manteco's circular initiatives are primarily centered on the recycling of wool and other textile materials, as well as the design of durable and sustainable fabrics. These activities align with the company's overarching circular strategies, which aim to minimize waste, maximize material reuse, and enhance product longevity.

The company operates within a closed-loop model, wherein textile waste-including post-consumer garments-is transformed into high-quality recycled wool. This approach not only reduces the environmental impact of textile production but also optimizes resource efficiency. Beyond its operational processes, Manteco actively engages in stakeholder education on circular practices, both through internal initiatives and strategic collaborations with academic institutions and industry partners.

Manteco's commitment to circularity extends beyond recycling to encompass the entire product lifecycle, including design, material sourcing, and end-of-life management.

Governance: To ensure the effective functioning of its circular economy ecosystem, Manteco employs different governance mechanisms. These include the Values Charter, which aligns all ecosystem participants with the company's sustainability and circularity objectives. Serving as a foundational framework, the Values Charter establishes shared principles and operational standards for all partners within Manteco's ecosystem.

In addition, the company relies on its Code of Conduct and Sustainability Report to enforce accountability and transparency across its operations. These governance instruments facilitate the monitoring of performance and the reinforcement of Manteco's commitment to its core values and strategic objectives. By documenting its achievements and setting forth future targets in the Sustainability Report, Manteco ensures both high transparency and continuous progress.

Furthermore, when there is a misalignment between the values and vision of ecosystem actors, Manteco fosters cultural alignment through the provision of customized training programs tailored to the specific needs of the stakeholders involved.

Manteco's governance structures are integral to ensuring stakeholder engagement, fostering trust, and minimizing potential conflicts. Structured initiatives, such as Project 43, are designed to align the values of various stakeholders, thereby facilitating collaboration and ensuring that all participants in the ecosystem are working towards shared sustainability goals.

Framework Development: An exploratory framework for Circular Economy Ecosystems

We propose an exploratory multidimensional framework for Circular Economy Ecosystems (CEEs), grounded in the qualitative analysis of the Manteco case study. Building on Trevisan et al.'s (2022) five foundational dimensions-value creation and appropriation, actor configuration and interrelations, data, materials, and resource flows, circular strategies and activities, and governance structures-this framework integrates environmental, economic, and social facets of CEEs, with findings anchored in Manteco's practices as revealed through systematic literature review and case study data (see Table 1). The framework's emergence from Manteco's ecosystem underscores its empirical basis, offering a structured lens to understand how CEEs balance sustainability objectives in a real-world context.

The framework's environmental dimension reflects Manteco's commitment to minimizing ecological impact, evident in its mechanical wool recycling processes that transform discarded garments into high-quality fabrics, reducing waste and virgin material use. Economically, it captures Manteco's approach to sustaining profitability through durable, recyclable products and an efficient closed-loop supply chain, aligning with market demands for sustainable textiles. Socially, the framework highlights Manteco's role in fostering societal benefits, particularly through the Manteco Academy, established in 2018, which educates students and engages communities worldwide on circular principles via lectures, webinars, and the Manteco Sustainability Award. Analysis of interviews with Dr. Giuseppe Picerno and Dr. Luca Querci, alongside secondary data, revealed these initiatives as pivotal to co-creating social value with 40+ academic and industry partners.

Manteco's ecosystem further informs the framework's dimensions. Actor configuration emerges from its network of suppliers, subcontractors, customers, and institutions (e.g., Ellen MacArthur Foundation), coordinated through long-term relationships and the Manteco System's Values Charter. Resource flows are optimized by integrating recycled wool and transparent data systems, a practice identified in sustainability reports and reinforced by interview insights on stakeholder collaboration. Circular strategies, such as durable fabric design and textile recycling, align with Manteco's operational model, while governance mechanisms-including the Values Charter, Code of Conduct, and tailored training (e.g., Project 43)-ensure alignment across actors, as evidenced by the company's emphasis on trust and accountability. "The framework, derived from Manteco's case analysis, models CEEs as dynamic systems where environmental, economic, and social roles interplay through core processes (Table 1). For instance, co-creation ties Manteco's recycling to profitability and education, while governance alignment unifies actors via the Values Charter, offering a replicable structure for CEEs beyond textiles

Tab. 1: An Explorative framework for Circular Economy Ecosystems (CEEs)

Dimension	***Environmental Role***	***Economic Role***	***Social Role***	***Core Process (Manteco-Derived)***
Value Creation & Appropriation	*Reduces ecological footprint via efficient resource use.*	*Secures revenue through durable, circular outputs.*	*Strengthens societal impact via stakeholder engagement.*	*Co-creation links recycling (environmental) to profitability (economic) and education (social, e.g., Academy).*
Actor Configuration & Interrelations	*Connects partners for sustainable material cycles.*	*Aligns stakeholders for market scalability.*	*Builds collaborative networks for societal benefit.*	*Orchestration integrates suppliers, firms, and institutions (e.g., 40+ partners) across goals.*
Data, Materials, & Resource Flows	*Enhances circularity through recycled resources.*	*Optimizes costs via streamlined flows.*	*Shares knowledge to enhance community capacity.*	*Resource integration ties material reuse (e.g., wool) to efficiency and awareness (e.g., data transparency).*
Circular Strategies & Activities	*Lowers impact with eco-focused recycling.*	*Sustains viability via scalable circular models.*	*Promotes circular practices through education.*	*Strategy alignment blends recycling (environmental) with business models (economic) and learning (social, e.g., Award).*
Governance Structures	*Sets sustainability standards for ecosystem actors.*	*Ensures economic coordination across partners.*	*Fosters trust and inclusion via shared objectives.*	*Governance alignment uses charters (e.g., Values Charter) to unify triple-bottom-line aims.*

Research limitations. *This study's reliance on a single case (Manteco) limits generalizability across industries, despite its depth. Qualitative data from interviews and company reports may reflect self-representation biases, lacking external stakeholder perspectives (e.g., communities, NGOs). Additionally, the social dimension's scope-focused on education and awareness-overlooks broader impacts like labor conditions or equity, warranting future longitudinal or multi-case research.*

Theoretical and Managerial implications. *This study contributes to the emerging stream of research on Circular Economy Ecosystems (CEEs) by incorporating the often-overlooked social dimension. While previous studies have predominantly focused on the economic and environmental aspects of CEEs, this paper advances the literature by examining how CEEs can generate social value through collaboration, education, and stakeholder engagement. Furthermore, it addresses the lack of empirical research in the field, as highlighted by Trevisan et al. (2022).*

From a managerial perspective, this research provides useful insights for practitioners seeking to develop and implement CEEs that not only prioritize environmental sustainability but also yield positive social outcomes. Manteco's initiatives, such as the Manteco Academy and the Manteco Sustainability Award, serve as exemplary models of how companies can embed circularity into their business strategies while fostering social learning, reinforcing local partnerships and promoting a culture of sustainability.

Managers can gain valuable lessons from Manteco's engagement with a wide range of stakeholders, including universities, customers, suppliers, and local communities, to co-create value and establish a shared vision for circularity. The study emphasizes the importance of collaborative governance, trust-building and inclusive practices in ensuring long-term sustainability and resilience within circular ecosystems.

Moreover, this research provides guidance on how companies can develop circular business models that are not only economically viable and environmentally responsible but also socially impactful. By adopting strategies that integrate educational initiatives, sustainability awards, and cross-sector collaborations, managers can contribute to broader societal goals such as social equity, community engagement, and capacity building. In doing so, businesses can align their strategies with the global sustainability agenda, advancing both corporate and societal well-being.

Originality of the paper. *This paper pioneers a CEE framework uniting environmental, economic, and social dimensions, leveraging Manteco's case to empirically foreground social value, a novel contribution to circularity scholarship.*

Key words: *Circular Economy (CE), Circular Economy Ecosystems (CEEs), Comprehensive framework, social value*

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An exploratory study on consumer sustainable responses to nature-inspired VR brand experiences

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Abstract

As the demand for sustainability is reshaping the branding landscape, purpose-driven brands are leveraging emerging technologies, such as virtual reality (VR), to create brand experiences that encourage sustainable consumer responses. While nature-based experiences have been shown to enhance awe, connectedness with nature, and environmental consciousness for sustainable consumption, little is known about how these responses manifest in VR-based natural environments. Given Gen Z's strong commitment to sustainability, this study investigates their sustainable responses to VR nature-based brand experiences using a cluster analysis approach. Based on 321 questionnaires, the findings identify three distinct Gen Z consumer clusters based on their perceptions of connectedness with nature, awe, and environmental consciousness for sustainable consumption. Each cluster exhibits different perceptions of the VR brand experience and sustainability-related personal characteristics. This research contributes to the brand-purpose literature by offering insights into consumer sustainable responses in virtual environments and providing managerial implications for enhancing brands' impact on sustainability.

Keywords: *brand experience, virtual reality, nature, consciousness for sustainable consumption, awe, connectedness with nature, cluster analysis*

Framing of the research. *The growing emphasis on sustainability is transforming the branding landscape. No longer confined to their traditional commercial roles, brands are increasingly recognized as agents of social change (Swaminathan et al., 2020). Within this context, purpose-driven branding aims to reshape consumer practices, expanding the social role of brands and deepening their impact on consumers (Hajdas & Kłeczek, 2021; Gray et al., 2024).*

Among marketing strategies designed to influence consumer behavior positively, Bahl et al. (2016) highlight the importance of experiences that foster deeper reflection on the human conditions of existence, which are intrinsically tied to the natural life cycles. Psychological research has long emphasized the significance of nature-based experiences in enhancing self-reflection and psychological well-being (Naor & Mayseless, 2020). Moreover, interactions with nature-whether in remote landscapes such as forests or in urban settings like parks and gardens-have been linked to emotional and cognitive benefits that encourage sustainable consumption behaviors (Rosa & Collado, 2019). Nature experiences have been found to evoke positive consumer responses, including awe (a self-transcendent emotion characterized by a sense of vastness and a need for cognitive accommodation), connectedness with nature (a deep emotional bond with the natural environment), and environmental consciousness for sustainable consumption (a heightened intention to adopt environmentally responsible consumption practices) (Agu et al., 2022; Liu et al., 2023). These cognitive and emotional responses play a crucial role in fostering sustainable consumption behaviors (Arruda et al., 2017; Dong et al., 2020; Jaiswal & Bihari, 2020; Keltner, 2025).

Despite these benefits, evidence suggests that direct experiences with nature are declining, contributing to a range of behavioral concerns (WiseSociety, 2021). Advances in digital technology, however, offer alternative ways to engage with the natural world through digital media, virtual environments, and video games (Truong & Clayton, 2020). In this regard, virtual reality (VR) has emerged as a key technology, enabling the creation of immersive, multisensory virtual environments that replicate real-world nature experiences (Bonetti et al., 2018).

With purpose-driven brands increasingly investing in sustainability initiatives, VR presents a promising tool for developing nature-based brand experiences that enhance consumer sustainable responses. Several brands have already harnessed VR to deliver nature-inspired experiences, such as National Geographic's virtual expeditions to the Arctic and

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Peru and The North Face's 360° exploration of Mont Blanc (MetaStore, 2019; Sport Press, 2021). However, little is known about how consumers respond to VR nature-based brand experiences in terms of connectedness with nature, awe, and environmental consciousness for sustainable consumption. As Gen Z is projected to become the dominant global consumer group in the coming years (Jeong & Kim, 2024) and demonstrates a strong commitment to sustainable consumption (Jiang et al., 2024), this study aims to explore how Gen Z consumers respond to VR-based nature brand experiences concerning awe, connectedness with nature, and consciousness for sustainable consumption, using a cluster analysis approach.

VR brand experiences elicit consumers' internal responses across social, sensory, intellectual, behavioral, and affective dimensions (Lee & Cho, 2023). However, research remains limited on how these dimensions characterize distinct clusters of Gen Z consumers based on their sustainable responses. Additionally, prior research emphasizes the role of personal factors in shaping sustainable consumer behavior, such as perceived responsibility for environmental damage and environmental cause knowledge. Therefore, this study seeks to describe Gen Z consumer clusters based on sustainable responses by considering different VR brand experience perceptions (i.e., social, sensory, intellectual, behavioral, and affective) alongside key sustainability-related personal characteristics (perceived responsibility for environmental damage and environmental cause knowledge).

Theoretical Background

Awe. *Awe is an epistemic emotion characterized by surprise, doubt, admiration, and reverence. It is defined by two core appraisals: perceived vastness and the need for accommodation (Keltner & Haidt, 2003). As Keltner and Haidt (2003) observed, awe-inducing events can serve as powerful catalysts for personal transformation and growth (p. 312). Indeed, awe has been extensively studied as an emotion that promotes sustainable and pro-environmental behaviors (Kaplan et al., 2024; Su et al., 2025). In a recent study, Keltner (2025) identifies eight categories of awe-inducing experiences: moral beauty, nature, collective effervescence, visual design, music, spirituality, big ideas, and the life cycle. Among these, nature's ability to inspire awe has been particularly recognized (Ivanhoe, 1997; Craig et al., 2018).*

With the advancement of new technologies, awe-inspiring experiences have become increasingly accessible to consumers. VR technology has been leveraged to create immersive nature-based experiences, providing highly realistic environments that evoke profound emotional responses (Quesnel & Riecke, 2018; Chirico et al., 2023; Menkhaus, 2024).

Previous research highlights that consumers' experiences of awe in nature are shaped by various factors, including personal characteristics (e.g., feelings of smallness, spirituality, and perceptions of environmental repairability; Kaplan et al., 2024) and, in the context of VR, by the setting of the VR-based experience itself (e.g., personal and social engagement during the experience; Chirico et al., 2023).

In marketing literature, awe has primarily been explored as a precursor to pro-environmental behavior, particularly in the context of tourism experiences (Su et al., 2025). However, there is limited understanding of how awe manifests within nature-based VR brand experiences.

Connectedness with nature. *Connectedness with nature is defined as an individual's emotional and experiential bond with the natural world (Mayer & Frantz, 2004). This connection has been found to improve the interest in environmental protection (Perkins, 2010) and more sustainable consumption behaviors (Dong et al., 2020). Growing evidence suggests that nature connectedness can be influenced by specific activities or circumstances, such as experiences in natural settings (Louv, 2008).*

VR technology offers highly realistic natural experiences that can foster a sense of nature connectedness (Brambilla et al., 2024). Research indicates that consumers' connectedness with nature in VR-based experiences is shaped by various factors, including personal attributes (e.g., nature affinity; Leung et al., 2022) and experiential elements (e.g., multisensory engagement, interactivity, visual realism; Brambilla et al., 2024).

In marketing literature, connectedness with nature has primarily been explored as a predictor of green purchase behavior (e.g., Dong et al., 2020). However, there is limited research on how this perception emerges within VR-based brand experiences.

Environmental consciousness for sustainable consumption. *Environmental consciousness for sustainable consumption refers to a consumer's concern about the environmental impact of products, including whether they are made from recycled materials, can be disposed of in an environmentally friendly manner, are sustainably packaged, and are produced using environmentally responsible practices (Balderjahn et al., 2013). This form of environmental consciousness has been shown to positively influence sustainable consumption behavior (Sun et al., 2024).*

Previous literature has paid little attention to the role of marketing experiences in shaping environmental consciousness for sustainable consumption. However, research suggests that exposure to nature can enhance this awareness (Nisbet et al., 2009), and studies have highlighted the potential of VR as a tool for fostering environmental concern through nature-based experiences (Nelson et al., 2020).

In this context, research indicates that consumers' environmental consciousness for sustainable consumption is influenced by personal characteristics such as pro-environmental self-identity, social norms, environmental awareness, education, and income (Balderjahn et al., 2013; Sun et al., 2024). However, less is known about the experiential dimensions that shape this consciousness, particularly within VR-based marketing contexts.

Notably, no studies have explored how environmental consciousness for sustainable consumption arises during a nature-based brand experience in VR.

Considering the significant role of Gen Z in both sustainable purchasing behavior (Jeong & Kim, 2024; Jiang et al., 2024) and their affinity for VR technology (Statista, 2023), it is essential to understand their sustainable responses when experiencing a VR brand in a natural setting. Therefore, the first objective of this study is:

***Objective** 1 - To identify Gen Z clusters based on sustainable consumer responses (i.e., awe, connectedness with nature, and environmental consciousness for sustainable consumption) during a VR brand experience in a natural setting.*

***VR brand experience.** Virtual reality (VR) brand experience is defined as "consumers' subjective, internal, and behavioral responses that are evoked by specific brand-related attributes" within VR-based environments (Lee & Cho, 2023). The authors identify five key dimensions through which consumers engage with a brand in VR experiences: social, sensory, intellectual, behavioral, and affective.*

Existing research on VR brand experiences suggests that the sensory dimension of the VR experience can positively influence sustainable consumer responses (Laukkanen et al., 2022), such as awe through music (Pilgrim et al., 2017) and connectedness with nature through visual embodiment of a tree or an animal (Spangenberg et al., 2022). Additionally, some studies have focused on the affective dimension of VR brand experiences to explore its role in shaping sustainable consumer behavioral responses (Deng et al., 2024; Khanal, 2024).

However, an integrated perspective on the multisensory nature of VR brand experiences is lacking. It is still unclear how the different dimensions of VR brand experience (social, sensory, intellectual, behavioral, and affective) characterize consumers' experiences based on their sustainable responses-such as awe, connectedness with nature, and environmental consciousness for sustainable consumption-during nature-based VR brand encounters.

***Perceived responsibility for environmental damage and Environmental cause knowledge.** Perceived responsibility for environmental damage refers to the extent to which an individual believes they are directly or indirectly responsible for harming the environment (Schwartz, 1968). Research indicates that individuals who feel responsible for environmental damage, compared to those who do not, are more likely to engage in self-regulation, thereby enhancing their environmentally sustainable perceptions (Wu & Yang, 2018). For example, perceived responsibility for environmental damage has been shown to influence green consumption behaviors (Wu & Yang, 2018).*

Environmental cause knowledge refers to consumers' perceived understanding of environmental issues, and it has been found to significantly shape sustainable consumer responses (Liefländer et al., 2013; Hill & Lee, 2015). For instance, connectedness with nature is influenced by environmental cause knowledge (Liefländer et al., 2013).

Despite the importance of these variables in shaping sustainable responses, no studies have yet explored how they characterize consumers' experiences based on their sustainable responses (i.e., awe, connectedness with nature, and environmental consciousness for sustainable consumption) during a nature-based VR brand experience.

Given the limited insight into how dimensions of VR brand experiences and sustainability-related personal characteristics describe the consumers' experiences based on different sustainable responses, the second objective of this study is:

***Objective 2** - To describe clusters of Gen Z consumers based on their sustainable responses (i.e., awe, connectedness with nature, and environmental consciousness for sustainable consumption) by considering VR brand experience dimensions (social, sensory, intellectual, behavioral, and affective) alongside sustainability-related personal characteristics (i.e., perceived responsibility for environmental damage and environmental cause knowledge).*

Methodology. *To achieve the research objectives, we conducted an empirical survey targeting Gen Z users (ages 18-28) in Italy, as this group represents the most active demographic in VR-based experiences (ADC Group Data Center, 2022; McKinsey et al., 2022). Participants were recruited via email, and a total of 333 questionnaires were collected. After excluding 12 responses due to attention check failures or incomplete answers, we obtained 321 valid responses. The final sample was gender-balanced (57.6% women, 42.1% men, 0.3% non-binary) with an average age of 21.67 years (SD = 2.01). Regarding education, 68.8% of participants held a high school diploma, 22.4% had a bachelor's degree, 1.2% held a first-level master's degree, and 7.5% had a master's degree.*

To gather rich responses, each participant was invited to engage in a VR-based metaverse experience centered around a natural environment (i.e., The North Face) available in the Oculus store, using the highly immersive Meta Quest 2 headset. This experience was chosen because the brand is recognized as gender-inclusive, and the immersive environment enables users to navigate a natural setting, exploring the winding trails of Mont Blanc, the highest mountain in Europe. A designated room within the research department was set up for participants to join the immersive experience and complete the questionnaire.

The questionnaire was administered via SurveyMonkey® and comprised closed-ended questions divided into four sections. The first section included measurement scales for awe, connectedness with nature, and environmental consciousness for sustainable consumption. The second section focused on the five dimensions of the VR experience. The third section gathered descriptors related to sustainability-related personal characteristics for cluster analysis, such as perceived responsibility for environmental damage and environmental cause knowledge. Finally, the last section collected sociodemographic data, including age, gender, and education.

We adapted the seven-item, 7-point Likert scale from Chirico et al. (2017) concerning awe. Besides, we measured connectedness with nature by adapting the 14-item, 7-point Likert scale from Mayer and Frantz (2004), and environmental consciousness for sustainable consumption using the four-item, 7-point Likert scale from Balderjahn et al. (2013). Considering the VR experience, we adopted the 26-item, 7-point Likert multidimensional scale proposed by Lee and Cho (2023). Specifically, we assessed the following dimensions: social, sensory, intellectual, behavioral, and affective. Regarding the descriptive variables related to personal characteristics, we measured perceived responsibility for environmental damage by adopting the six-item, 7-point Likert scale proposed by Wu and Yang (2018), and environmental cause knowledge using Hill and Lee's (2015) four-item, 7-point Likert scale.

Results. *We initially conducted a confirmatory factor analysis (CFA) to evaluate the reliability and validity of the measurement model using LISREL software (Jöreskog & Sörbom, 2006). Specifically, we focused on the measurement model for the three variables used to identify the clusters: awe, connectedness with nature, and environmental consciousness for sustainable consumption. The results indicated a good model fit: $\chi 2(272) = 464.373$, root mean square error of approximation (RMSEA) = 0.045, standardized root mean square residual (SRMR) = 0.07, confirmatory fit index (CFI) = 0.96, and non-normed fit index (NNFI) = 0.98. Standardized factor loadings were all above 0.60, and each standardized item loading was significant ($p < 0.01$). The average variance extracted (AVE) for each variable exceeded 0.50 ($AVE_{AWE} = 0.51$; $AVE_{CONN} = 0.52$; $AVE_{ECSC} = 0.74$), and the composite reliability (CR) was above 0.70 ($CR_{AWE} = 0.88$; $CR_{CONN} = 0.94$; $CRE_{CSC} = 0.92$). Furthermore, Cronbach's alpha values were all greater than 0.70 ($\alpha_{AWE} = 0.88$; $\alpha_{CONN} = 0.94$; $\alpha_{ECSC} = 0.92$). The shared variance between factor pairs was always lower than the corresponding AVE, confirming discriminant validity (Fornell & Larcker, 1981). Overall, these results support the reliability and validity of the hypothesized measurement model (Bagozzi & Yi, 1988).*

To identify distinct groups of respondents, we conducted a nonhierarchical k-means clustering procedure (Ward's method), which was based on the respondents' standardized mean scores related to (1) awe, (2) connectedness with nature, and (3) environmental consciousness for sustainable consumption. The clustering procedure yielded a three-cluster solution, the generalizability of which to the entire population was confirmed by an adequate Rand index (.76) (Rand, 1971). We labeled the final groups of users according to the three clustering factors: ecological awakening minds, disconnected observers, ephemeral thrill-seekers (Table 1).

Tab. 1: K-means Cluster Analysis Results

	F-statistic	**Cluster**		
		1. Ecological awakening minds	2. Disconnected observers	3. Ephemeral thrill-seekers
Awe	169.945*	0.511	-1.137	0.208
Connectedness with nature	97.207*	0.486	-0.287	-1.175
Environmental consciousness for sustainable consumption	167.477*	0.469	-0.039	-1.548
N	321	179	90	52
% of sample	100%	55.76%	28.04%	16.20%

*Notes: *p<0.001.*

Ecological Awakening Minds (55.76%): Users in this group report the most pronounced feelings of environmental consciousness for sustainable consumption (0.469), a strong sense of connectedness with nature (0.486), and heightened awe (0.511). These findings suggest that this group exhibits the most profound interaction with environmental themes within the VR experience.

Disconnected Observers (28.04%): This group shows negligible awe, with the lowest score recorded among all clusters (-1.137). Furthermore, they display minimal feelings of environmental consciousness for sustainable consumption (-0.039) and a weak sense of connectedness with nature (-0.287).

Ephemeral Thrill-Seekers (16.20%): Users in this cluster experienced markedly the lowest connectedness scorewith nature and environmental consciousness for sustainable consumption (-1.175 for connectedness with nature and -1.548 for environmental consciousness for sustainable consumption). Interestingly, they showed a mild level of awe, with a score slightly above average (0.208).

The analysis used one-way ANOVAs to assess the differences among the three clusters based on their VR experience and sustainability-related personal characteristics. The independent variable in this analysis was cluster membership, while the dependent variables included the five dimensions of the VR experience (social, sensory, intellectual, behavioral, and affective) and two personal characteristics (perceived responsibility for environmental damage and environmental cause knowledge). The results in Table 2 indicate significant differences across all descriptive variables except for perceived responsibility for environmental damage. While the clusters differ in how they experience the VR content and their levels of environmental cause knowledge, their perceived responsibility for environmental damage is similar across all groups. Note that the variable scores have been standardized.

The findings highlight that the "Ecological Awakening Minds" cluster outperforms the other two clusters across all five dimensions of the VR experience. In terms of environmental cause knowledge, the "Ecological Awakening Minds" cluster stands out from the "Ephemeral Thrill-Seekers", indicating a stronger understanding or interest in environmental issues, whereas no significant difference was observed with the "Disconnected Observers". Notably, as shown in Table

3, no significant differences emerged across the three clusters regarding perceived responsibility for environmental damage. This suggests that, despite differences in VR experience perceptions, participants across all groups perceive themselves similarly in terms of environmental responsibility.

Table 2: One-way ANOVA, Cluster Means, and Significance Levels

	Cluster Mean			**Test Statistic**	**P Value**
Dependent Variables	1. Ecological awakening minds	2. Disconnected observers	3. Ephemeral thrill-seekers		
Social VR experience dimension	0.83	-0.13	-0.81	30,619	$p < 0.001$
Sensory VR experience dimension	0.32	-0.15	-0.85	35.966	$p < 0.001$
Intellectual VR experience dimension	0.29	-0.09	-0.86	32,443	$p < 0.001$
Behavioral VR experience dimension	0.28	-0.12	-0.75	25.469	$p < 0.001$
Affective VR experience dimension	0.31	-0.23	-0.67	26.565	$p < 0.001$
Perceived responsibility for environmental damage	0.06	-0.01	-0.17	4.678	$p = 0.010$
Environmental cause knowledge	0.14	-0.09	-0.32	1.075	$p = 0.343^{NS}$

Tab. 3: Multiple comparisons

Key Dependent Variables	**Cluster**		**Mean Difference**	**P Value**
Social VR experience dimension	1	2	0.432	*p<0.001*
		3	1,109	*p<0.001*
Sensory VR experience dimension	1	2	0.471	*p<0.001*
		3	1.182	*p<0.001*
Intellectual VR experience dimension	1	2	0.377	*p=0.005*
		3	1.151	*p<0.001*
Behavioral VR experience dimension	1	2	0.397	*p=0.003*
		3	1.026	*p<0.001*
Affective VR experience dimension	1	2	0.544	*p<0.001*
		3	0.985	*p<0.001*
Perceived responsibility for environmental damage	1	2	0.067	$p=1.000^{NS}$
		3	0.230	$p=0.435^{NS}$
Environmental cause knowledge	1	2	0.220	$P=0.257^{NS}$
		3	0.452	*p=0.012*

Originality of the paper. *This study shows how Gen Z consumers exhibit varying sustainable responses regarding awe, connectedness with nature, and environmental consciousness for sustainable consumption (Obj 1). The Ecological Awakening Minds experience sustainability comprehensively and profoundly, while the Disconnected Observers show apathetic responses. In contrast, the Ephemeral Thrill-Seekers display a strong emotional reaction (i.e., awe); however, this does not include environmental perceptions (i.e., connectedness with nature and environmental consciousness for sustainable consumption). Moreover, our findings reveal that the Ecological Awakening Minds perceive all five dimensions of the VR experience more intensely than the Disconnected Observers and Ephemeral Thrill-Seekers. Furthermore, this first cluster demonstrates greater environmental cause knowledge than the Ephemeral Thrill-Seekers, who show a lower level of awareness regarding environmental issues (Obj 2). This knowledge gap may explain the limited consumer responses related to nature, including connectedness with nature and environmental consciousness for sustainable consumption, despite the positive emotional response regarding awe.*

These findings contribute to the academic literature in several ways. First, it highlights a new opportunity for purpose-driven brands to foster sustainable consumer responses (i.e., connectedness with nature, awe, and consciousness for sustainable consumption) through nature-based brand experiences in VR. Second, it is the first study to identify variations in sustainable consumer responses to VR-based metaverse experiences among Gen Z user groups, shedding light on distinct response patterns within a generational cohort widely recognized as the most sensitive to sustainability issues (Jeong & Kim, 2024; Jiang et al., 2024). Finally, this research advances the literature on VR brand experience dimensions and sustainability-related personal characteristics (i.e., perceived responsibility for environmental damage and environmental cause knowledge) by revealing differences among Gen Z groups based on their sustainable consumer responses (Liefländer et al., 2013; Hill & Lee, 2015; Pilgrim et al., 2017; Laukkanen et al., 2022; Spangenberg et al., 2022; Deng et al., 2024; Khanal, 2024).

Managerial implications. *From a managerial perspective, this study highlights the potential of nature-based VR brand experiences to elicit diverse sustainable consumer responses, including connectedness with nature, awe, and consciousness for sustainable consumption. Moreover, our findings reveal that different Gen Z clusters exhibit distinct perceptions of the VR brand experience as well as varying personal characteristics. Based on these insights, we recommend that brands tailor their strategies to align with the specific consumer responses identified in this study. First, for the Ecological Awakening Minds cluster, which demonstrates strong sustainable consumer responses and a highly positive VR brand experience across social, sensory, intellectual, behavioral, and affective dimensions, brands should further invest in conveying nature-based experiences, as this may deepen their commitment to sustainability. Second, to mitigate disengagement in the Disconnected Observers cluster, managers should investigate the underlying reasons for*

their passive responses and refine engagement strategies accordingly. Making sustainability-related content more relevant and emotionally compelling could foster stronger consumer-sustainable responses. Third, to effectively engage the Ephemeral Thrill-Seekers cluster, which responds emotionally to the experience but does not fully recognize its environmental implications, brands should seamlessly integrate educational content related to sustainability into the VR experience.

Research limitations. *This study is not without limitations, which offer opportunities for future research. First, the analysis was purely exploratory; future studies should examine causal relationships between different dimensions of the VR brand experience, personal characteristics related to sustainability, and sustainable consumer responses (i.e., connectedness with nature, awe, and consciousness for sustainable consumption). Second, this study focused exclusively on Italian Gen Z consumers who engaged in a nature-based brand experience (i.e., The North Face) without an embodied avatar and realistic interactions. Future research should expand the sample to include participants from different countries and generational groups (e.g., Millennials) and explore fully immersive environments (e.g., first-person perspective through an embodied avatar, realistic interactions) to assess sustainable consumer responses in a more lifelike setting. Third, this study does not provide sufficient descriptive information on the Disconnected Observers; therefore, future research could adopt an exploratory qualitative approach to identify additional factors contributing to this cluster's apathetic disengagement from the experience.*

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Beyond Good Intentions: Unpacking the Paradoxes of Responsible Consumption Across Sectors

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Abstract

As global anxieties surrounding environmental degradation and social inequalities escalate, consumers increasingly seek to align their consumption choices with their values, prioritizing environmentally and socially responsible products and services. However, transforming this heightened awareness into consistent and impactful behavioral change is complex and often fraught with contradictions.

This investigation seeks to delineate the theoretical distinctions and interconnections between two key paradigms in responsible consumption. Recognizing that these concepts manifest differently across industries, this research adopts a comparative lens, examining their practical implications within the food, and fashion sectors. By employing a mixed-methods approach, integrating qualitative analysis of social media discourse with quantitative data from a consumer survey, this study investigates how sustainable and socially responsible consumption behaviors are uniquely exhibited within each sector, the specific factors influencing their adoption, and the emergence of paradoxical outcomes. Through this multifaceted exploration, the study aims to contribute an understanding of responsible consumption paradoxes, offering valuable theoretical and practical insights for academics, businesses, and policymakers.

Framing of the research. *As global awareness of environmental degradation and resource depletion intensifies, consumers are increasingly aligning their purchasing decisions with environmental and social well-being. However, the relationship between this heightened environmental awareness and actual consumer behavior is complex and often paradoxical, necessitating further investigation.*

Sustainable consumption, as defined by Kautish and Sharma (2019), provides a framework for understanding this complex relationship. It emphasizes the use of goods and services that meet basic needs and improve quality of life while minimizing resource depletion, waste, and pollution throughout a product's life cycle. This approach, therefore, aims to ensure that the needs of future generations are not compromised (Holden et al., 2014). A comprehensive investigation of the inherent contradictions and multifaceted dynamics within this theoretical framework is essential for elucidating the discrepancy between environmental consciousness and actual consumer decision-making patterns.

Environmental concerns thus play a pivotal role in defining these consumption patterns. Yet, as the concept of sustainability gets to cover both social, economic, and environmental dimensions, responsible practices that could be adopted by consumers range within a larger span of behaviors that go beyond environmentally friendly and green practices. In this sense, the wider concept of socially responsible consumer and, consistently, socially responsible consumer behavior have emerged to indicate individuals that are driven in their consumption patterns by the desire to minimize or eliminate any harmful effects, while maximizing the long-term beneficial impact on society through the acquisition, usage and disposition of products (Mohr et al. 2001). A recent study from Sharma et al. (2025) provides an interesting systematization of socially responsible consumption, focusing on the ways it overlaps with related concepts. According to the authors socially responsible consumption differs from ethical consumption, green consumption, socially conscious consumption, and sustainable consumption under five main dimensions, i.e., human, social, environmental, economic, and perceived sense of responsibility. In the authors' view, socially responsible consumption is the only construct that involves all the five dimensions, with the other four being a combination of some of those (Sharma et al., 2025). In this sense it differs from sustainable consumption as the latter lacks consumer's perceived sense of responsibility, as individuals might buy sustainable products regardless of motivation (Falcão and Roseira 2022).

Consistently with the concept of consumer social responsibility (Zabel et al., 2023), this sense of responsibility depends upon individuals' moral principles and standards. Further elements of distinction might come from extant literature about the barriers to sustainable consumption. For example, Ramayah et al. (2010) state that habits play a pivotal role in influencing the purchasing behavior of sustainable products, as consumers are not persistent enough in practicing a new behavior until it becomes a habit. This could have an impact on both sustainable and socially responsible consumption

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practices which might be hampered or fostered by individuals' habits. A further element are subjective norms, which have been investigated concerning green products as a strong source of influence on individuals' intention to act (Paladino and Ng, 2013).

Vermeir and Verbeke (2006) studied the green purchasing behavior of young consumers and found that friends and family are usually not very convinced that the consumer should purchase green products. However, social pressure exerted by peers is an explanatory variable of the intention to purchase green products (Vermeir & Verbeke, 2006). Taking this into account and the fact that Generation Y is mainly loyal to its closest circle (Hume, 2010), subjective norm is likely to positively influence the young consumer's attitude-behavior relationship.

In addition to individual identity, social or group identity influences sustainable behavior. People's attitudes, beliefs, and behaviors are influenced by the social groups to which they belong (Tajfel, 1982), sometimes even more than their personal identity (Onorato and Turner, 2004). People tend to imitate behaviors that reinforce their group identity and their in-group ties. Attitudes and behaviors are strongly influenced by other trusted individuals who share their in-group membership (people who share their social identity).

Other aspects that might be relevant in determining sustainable or socially responsible consumptions include consumers' perceived effectiveness and perceived importance. In the case of sustainable consumption considerations, high levels of perceived product effectiveness are essential for consumers to translate positive attitudes towards the environment into sustainable purchasing behavior (Vermeir and Verbeke, 2006). Vermeir and Verbeke (2006) suggest that to change their behavior, consumers must believe that purchasing a sustainable product has a positive impact on the environment.

The level of personal involvement with the environment determines the number of sustainable purchases made by consumers. Vermeir and Verbeke (2006) point out that consumers may have a very positive attitude towards sustainability, but they do not believe that environmental conservation is their responsibility and do not actually experience the consequences of, for example, environmental pollution. Consumers with low levels of perceived personal importance instead consider environmental issues as the direct responsibility of the state or businesses.

Self-defensive behaviors may also lead consumers to intentionally ignore information about ethical attributes of products to avoid negative emotions when making their purchase decisions (Ehrich and Irwin, 2005). For example, in their initial study, Ehrich and Irwin (2005) showed that consumers who reported being concerned about the environment and protecting rainforest wood were the least likely to request and use information about environmental attributes in their purchase decisions. By avoiding information about ethical attributes altogether, those who were most concerned about the environmental issue were able to justify purchasing an unsustainable option by defensively claiming their ignorance.

Thus, while partially overlapping, the concepts of sustainable consumption and socially responsible consumption imply the adoption of specific behaviors and, consequently, different effects at micro and macro levels (Sharma et al., 2025). Among the effects of these behaviors, extant research has identified several key paradoxes that highlight the complexities involved. As for sustainable behavior for example, a prominent paradox is the "green consumption paradox" (Peattie and Collins, 2009), where consumers' purchase of green products does not necessarily lead to a reduction in overall consumption or environmental impact.

Another critical paradox is the "knowledge-action gap" or "value-action gap" (Kollmuss and Agyeman, 2002), where high levels of environmental knowledge and positive attitudes towards sustainability do not always translate into sustainable behaviors. Barth et al. (2012) extensively reviewed this gap, pinpointing various psychological, social, and structural barriers that prevent consumers from acting on their pro-environmental intentions. These barriers include habits, perceived lack of efficacy, financial constraints, and the social norms that prioritize convenience and consumption.

These contradictions could be explained by adopting a genealogical-narrative framework (Altuna et al., 2017) that delineate the evolutionary trajectory of sustainability values through two interdependent phases: the Generation Phase and the Institutionalization Phase. This lens reveals how the ascent of sustainability from grassroots movements to institutional norms engenders systemic paradoxes, wherein the commodification of ethical imperatives subverts their transformative potential. The Generation Phase encapsulates the socio-cultural processes through which novel sustainability paradigms are conceived within radical circles-informal collectives of activists, ethical entrepreneurs, and visionary networks that challenge hegemonic consumerist ideologies (Verganti, 2009). These actors reimagine sustainability as a meaning-driven innovation, embedding it in practices such as agroecology, circular design, and fair trade (Altuna et al., 2017). For instance, Italy's Slow Food movement (1989-present) redefined gastronomy as a vehicle for biodiversity preservation and social justice, formalizing its ethos through manifestos that critique industrial agriculture (Slow Food International, 2023). Such movements generate emancipatory meanings but remain peripheral to mainstream institutional structures, deriving legitimacy from niche communities and subcultural validation.

The Institutionalization Phase signifies the transformation of sustainability values from marginal propositions into codified norms, operationalized through regulatory frameworks (e.g., the EU Green Deal), corporate social responsibility (CSR) initiatives, and consumer certification regimes (e.g., Fair Trade, B Corp). This phase involves the strategic appropriation of grassroots terminology-such as "circular economy" or "net-zero"-by institutional actors, a process that often dilutes radical intent to align with growth-oriented imperatives (Stern, 2000). For example, the discourse of sustainable development, initially advanced by environmental NGOs, now underpins multinational corporate strategies that prioritize incremental efficiency gains over systemic transformation (Banerjee, 2008).

The interplay between Generation and Institutionalization activates sustainability paradoxes, which arise from three interrelated mechanisms:

1. *Reinterpretation Asymmetry: Institutionalized norms reinterpret radical frameworks to fit existing power structures. For instance, green consumerism, born of anti-industrial activism, now sustains hyperconsumption under the guise of eco-labeling.*
2. *Decoupling of Means and Ends: Practices such as carbon offsetting, while institutionalized as "sustainable," often perpetuate socio ecological harm (e.g., land dispossession in Global South regions) (Lohmann, 2011).*
3. *Cultural Commodification: Grassroots symbols (e.g., indigenous ecological knowledge) are commercialized into marketable aesthetics, devoid of their emancipatory essence (e.g., "boho-chic" ethical fashion campaigns).*

Altuna et al. (2017) posit that such paradoxes stem from unequal power dynamics during Institutionalization, wherein radical innovators (cultural interpreters) cede discursive control to institutional elites who reframe sustainability within hegemonic economic paradigms. This mirrors Verganti's (2009) theory of design-driven innovation, where dominant actors orchestrate value-system shifts without addressing structural contradictions.

Purpose of the paper. *The purpose of this paper is to investigate the differences between sustainable consumption and socially responsible consumption when concretely adopted within two specific industries: food and fashion industries. In particular, the research aims to answer three research questions:*

RQ1. How do sustainable behavior and socially responsible behavior come about within specific industries?

RQ2. Which are the elements that drive individuals towards each of them?

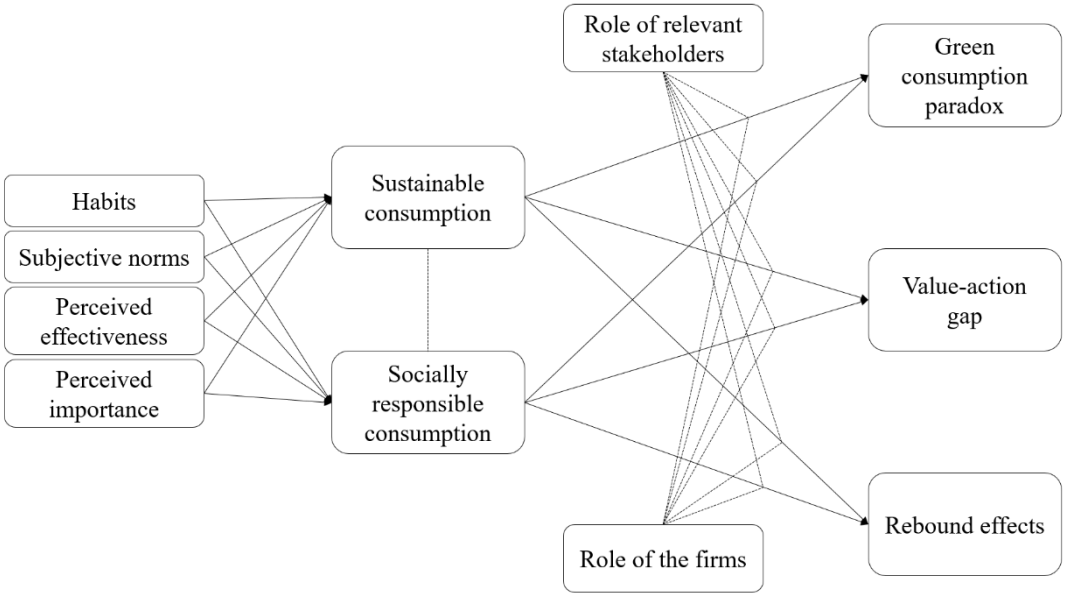
RQ3. How do these behaviors determine the emergence of behavioral paradoxes?

In this sense the goal is to identify the differentiating elements among these concepts focusing on consumers, firms, and relevant stakeholders which might act as influencers in the purchasing process. In fact, to answer RQ1 and RQ2, consumers' perspective allows to identify the adopted behaviors; firms' perspective sheds light on the role of communication initiatives in orienting and promoting these behaviors; relevant stakeholders' perspective supports the identification of further source of influences that might play a role towards these consumers behaviors. The analysis will focus on two different industries that are particularly suited for the purpose of the research: food and fashion industries. The food industry serves as an ideal research context due to its dual role as a: (i) high-impact sector: agriculture, food production, and distribution account for 26% of global greenhouse gas emissions, 70% of freshwater use, and 50% of habitable land degradation (Poore & Nemecek, 2018); (ii) moral and cultural nexus: food choices are deeply tied to identity, ethics, and societal norms (e.g., veganism, fair trade), making it fertile ground for analyzing tensions between values and behaviors; (iii) pioneer in sustainability movements: from Slow Food (Altuna et al., 2017) to regenerative agriculture, the sector has incubated radical ideas that later became mainstream, offering a rich case for studying institutionalization and contradictions. Similarly, fashion industry presents: (i) high environmental impact: responsible for 10% of global carbon emissions, 20% of wastewater, and massive microplastic pollution (Ellen MacArthur Foundation, 2017); (ii) moral contradictions: "slow fashion" movements coexist with fast fashion's exponential growth (e.g., Shein's $100B valuation despite labor and ecological violations); (iii) radical circles: grassroots movements like Fashion Revolution and designers advocating for circular economy models (e.g., Patagonia's Worn Wear program).

The identification of behavioural practices will be useful to understand the relation between sustainable consumption and socially responsible consumption and the paradoxical behaviours that emerged from the literature analysis, to answer RQ3. Through this investigation, the research aims to contribute to the existing body of knowledge by providing nuanced insights into the paradoxes of responsible consumption, also offering valuable guidance for policymakers, businesses, and educators in devising strategies that effectively promote these consumption patterns.

The proposed integrated framework (Fig. 1) captures the complex interplay between individual behaviors, organizational factors, and systemic outcomes in sustainable consumption patterns, providing a theoretical foundation for analyzing the gap between environmental intentions and actual consumer behavior.

Fig. 1: A proposed model for empirical research



Source: Authors'elaboration

Methodology. *This research investigates the evolution of sustainability discourse through a three-pronged analytical framework examining Generation, Institutionalization, and Development phases, addressing how sustainability narratives emerge, gain societal traction, and generate internal contradictions through two complementary studies. Quality assurance is maintained through systematic content verification, standardized processing procedures, and regular peer review, ensuring scholarly rigor throughout the research process.*

Study 1: Social Media Analysis

The first study examines the evolution of sustainability discourse through social media platforms, aiming to identify concrete behaviors within specific industries (RQ1) and differentiate between sustainable consumption and socially responsible consumption (RQ2). Data collection will be based on data scraping using public APIs (Trezza, 2023), focuses on Facebook, X and Instagram platforms, analyzing sustainability-related content from 2020-2025.

The data collection framework encompasses specific inclusion criteria: posts explicitly addressing sustainability and ethical consumption, geographically diverse sources (including translated non-English content), and content demonstrating authentic engagement with sustainability issues. Content excluded from analysis includes spam, advertisements, bot-generated content, and irrelevant or duplicate posts, ensuring data quality through both LLM-based (Gan et al., 2023) and manual verification processes.

Through narrative analysis, we examine how sustainability stories evolve across the three phases, while qualitative content analysis employs a theoretically grounded coding framework to track thematic patterns (Weber et al., 2012). Frame analysis investigates the transformation of sustainability frames (Cornelissen & Werner, 2014), with particular attention to sentiment-action dissonance and semantic incongruence between sustainability claims and actual behaviors.

Data preprocessing involves systematic noise removal, tokenization, and standardization procedures to ensure consistent analysis across multilingual content. This process includes the removal of technical elements (URLs, emojis), text standardization through lemmatization, and professional translation of non-English content (Nesca et al., 2022).

Study 2: Survey Research

Building on insights from Study 1, a comprehensive survey will be administered to a population of consumers from diverse socioeconomic backgrounds. This quantitative phase examines how individuals engage with sustainability narratives at different stages of institutionalization and how this engagement relates to paradoxical behaviors. The survey instrument incorporates measures derived from the three-phase analysis of the qualitative data. Data collection will employ stratified random sampling to ensure representation across different age groups, income levels, and educational backgrounds. The survey will be administered online through professional survey platforms, with built-in quality control measures including attention checks and response time monitoring. To enhance response quality, the questionnaire will undergo pilot testing with a smaller sample (n=30) to refine question wording, survey flow, and completion time. The goal of this phase will be to investigate the relationship between sustainable consumption and socially responsible consumption with the emergence of paradoxical behaviours, to identify those elements that have a larger impact on determining them (RQ3).

Data analysis
Study 1
The analysis of social media data follows a systematic approach to examine the evolution of sustainability narratives and identify emergent paradoxes in sustainability discourse.
The thematic evolution analysis examines how sustainability narratives emerge and transform over time. Through topic modeling techniques based on BERTopic (Najmani et al., 2023), we will identify dominant themes characterizing each phase of narrative development. This enables us to track how sustainability discussions initially emerge, gain mainstream acceptance, and eventually develop complexities and contradictions. Temporal analysis further allows us to identify significant shifts in discourse, particularly around key events that may have influenced sustainability narratives.
To examine paradoxes within sustainability discourse, we employ a two-step analytical approach. First, we analyze intention-behavioral gap by identifying instances where positive sustainability attitudes coexist with contradictory behaviors in social media communication (Sukumaran & Majhi, 2024). Second, we examine semantic incongruence between sustainability claims and contextual evidence, with particular attention to potential greenwashing rhetoric and its relationship to actual environmental practices.
Quality assurance measures are implemented throughout the analytical process. These include systematic comparison of automated and human-coded samples to ensure reliability, with maintenance of inter-coder reliability (Cohen's $\kappa \geq 0.8$). Regular peer review sessions validate the identified themes and patterns, ensuring robust interpretation of the data.

Study 2
Correlation analyses will examine relationships between sustainability knowledge, attitudes, and behaviors. Multiple regression analyses identify key predictors of sustainable behavior and paradoxical patterns. Structural equation modeling tests the hypothesized relationships while controlling for demographic variables

Research limitations. *This research presents several notable limitations. First, the focus on two specific industries (food and fashion) may not fully represent the broader landscape of sustainable consumption patterns across different sectors. The study's methodology, particularly relying on social media analysis and surveys, introduces potential biases as consumers often report more positive sustainable behaviors than they practice.*

Managerial implications. *The findings offer valuable insights for business practitioners and policymakers. Organizations must develop integrated strategies that bridge the gap between consumers' environmental awareness and actual purchasing behaviors. This requires transparent communication about sustainability initiatives and their measurable impacts.*

Managers should recognize that different consumer segments require tailored approaches to sustainability messaging and engagement. Companies need to invest in technologies and processes that facilitate sustainable consumption while maintaining commercial viability.

Originality of the paper. *The purpose of this paper is to investigate the differences between sustainable consumption and socially responsible consumption within specific industries and the effects these might generate in terms of paradoxical behaviours. In this sense the research presents several aspects of originality compared to extant contributions. First, it aims to consider and compare different forms of responsible behaviour, differentiating the effects each of these can have on the emerged paradoxes. This is particularly relevant as most contributions focus on sustainable or green consumption, without really disentangling the different meaning these constructs might have in terms of actual behaviours. Also, other forms such as socially responsible consumption have so far been overlooked or included in the concept of sustainable consumption, disregarding the specificities these might have. A second aspect concerns the attention to paradoxical consumption, that will shift the attention on actual behavioural practices. In fact, there has been a great attention towards motivation and attitude to responsible consumption with the goal to explain why individuals are inclined to adopt these behaviours. Yet the focus is often on the antecedents, leaving considerations about the actual behaviour scantly covered. Third, the research aims to explore these behaviours within specific industries, filling a gap of investigations which might offer valuable insights for future research.*

Keywords: *socially responsible consumption; sustainable consumption; paradoxes; mixed method; consumer behavior*

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Corporate Green Commitment: Exploring international exposure and value chain decarbonization

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Abstract

As the transition to a low-carbon economy accelerates, firms are under increasing pressure to demonstrate meaningful commitments to decarbonization and circularity. Nonetheless, the influence of internationalization on corporate sustainability initiatives remains mainly unexamined and somewhat unclear. This paper delves into how the varied international exposure of firms affects their dedication to decarbonization and the implementation of emission reduction strategies, with a special focus on Scope 3 and upstream emissions. By incorporating perspectives from sustainable innovation and international business, we investigate whether internationalization serves as a facilitator or a barrier to achieving carbon neutrality. We evaluate 117 Italian-listed companies that engage in sustainability reporting and assess how different internationalization modes-including ownership structures, market diversification, and managerial diversity-influence their sustainability commitments. Our results indicate that while a greater degree of internationalization (DOI) is positively associated with sustainability disclosures, ownership internationalization alone does not guarantee enhanced environmental responsibility. Furthermore, we differentiate between declared commitments to decarbonization and actual reductions in emissions, revealing potential discrepancies between corporate promises and real sustainability results. These findings enhance the understanding of how internationalization, circularity, and systemic innovation converge in the journey toward net zero, providing theoretical frameworks and managerial insights for companies navigating the complexities of global sustainability.

***Keywords**: Net-zero transition; internationalization; decarbonization; circular economy; multinational enterprises; sustainability innovation*

Framing of the research. *Transitioning to a low-carbon economy has emerged as a key challenge for the global community (Krieger & Zipperer, 2022). Governments, investors and consumers increasingly require companies to demonstrate their commitment to green business practices. In line with the European Union's ambitious target of net-zero greenhouse gas (GHG) emissions by 2050, organizations are called upon to take leadership roles in driving the shift toward carbon neutrality (Karim et al., 2021). In this context, internationalization emerges as a critical yet underexplored enabler-or constraint-of firms' decarbonization efforts. The heterogeneity in firms' international exposure may significantly shape how they perceive regulatory pressures, engage in sustainable practices, and commit to carbon neutrality (Kolk & Pinkse, 2008).*

Existing literature on sustainability has a strong emphasis on the firm, focusing on what drives and impedes firm efforts in making their processes and products more sustainable (Dangelico, 2016). Whilst acknowledging the role of regulatory forces, the industrial landscape, and a need to collaborate with a diverse range of stakeholders, this literature frequently isolates the notion of sustainable innovation to the boundaries of the firm and overlooks the systemic nature of the required innovation (Adams et al., 2016). However, achieving the decarbonization goals set by the Paris Agreement demands systemic innovation - coordinated transformations that cut across industries, geographies, and value chains. Recent discourse on net-zero transition has evolved beyond traditional energy switching and efficiency improvements. In fact, addressing global sustainability challenges requires a collaborative approach that extends beyond the boundaries of individual firms to embrace a more holistic perspective that integrates circularity into rethinking production processes, materials flow, and the very design of value chains (Pinkse et al., 2023). In line with ongoing research exploring low-carbon innovations, such as the deployment of green hydrogen across industrial value chains (Baglieri, 2024), this study underscores the relevance of systemic approaches to decarbonization in internationally exposed firms. Environmental

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transitions demand systemic innovation that no single organization or sector can accomplish independently. Consequently, supply and value chain integration enables multiple stakeholders to pool resources, expertise, and infrastructure, fostering innovation across industries (Iacovidou et al., 2020) while balancing significant financial and operational risks, especially in resource-intensive processes (De Marchi, 2012; Wesseling et al., 2017). These attributes make the circular economy a potent contributor to achieving zero-carbon prosperity, as circularity specifically builds upon three principles:

a) Design out waste and pollution to reduce GHG emissions across the value chain.
b) Keep products and materials in use to retain the embodied energy in products and materials.
c) Regenerate natural systems to sequester carbon in products and soil.

A recent theoretical framework shows that the input, process, and output constraints that incumbent firms face in the net-zero transition can be tackled through four firm-level innovation levers - i.e. recombinative, collaborative, integrative, and socio-cognitive capabilities - which, in concert, act as enablers for firms to address these net-zero constraints (Pinkse et al., 2024). In this paper, we build on this framework by addressing internationalization as a transversal enabling strategy to break path dependency and lock-in processes related to net-zero innovation.

Although the link between internationalization and environmental commitment has been widely discussed, empirical findings remain ambiguous and sometimes contradictory (Singhania & Saini, 2021). This relationship appears to depend on several factors, including firm size, industry sector, environmental policies, stakeholders' pressures, and the international market structure (e.g., Zhang et al., 2024). Some studies argue that international trade encourages decarbonization efforts and the adoption of circular practices (Ding et al., 2022; Huang & Liu, 2021). This is because companies operate within a broader social framework that drives them to adopt appropriate behaviour to mitigate external pressures and secure social approval and legitimacy within foreign markets (Yu et al., 2017). Furthermore, exporting firms often exhibit characteristics that enhance their environmental commitment; they are generally larger, more productive, more knowledge- and capital-intensive, making them more likely to invest in pollution-reducing technologies (Galani et al., 2012;Qi et al., 2021). Additionally, exporting exposes firms to the best international practices, facilitating green technology and environmental management systems transfer, further reinforcing their sustainability efforts. At the same time, increasing international competition forces firms to develop competitive strategies to sustain their market position (Sorroche-del-Rey et al., 2022). Among organizations, multinational enterprises (MNEs) might appear particularly committed to tackling climate change due to their exposure to growing pressure from multiple stakeholders worldwide, heightened media scrutiny, skepticism in host communities, and spillover effects among affiliates (Mithani, 2017; Wang & Li, 2019). These factors drive them to enhance their environmental sustainability efforts by leveraging their ability to build complementary green competencies and reconfigure embedded organizational resources to maintain a competitive advantage in a complex environment (Maksimov et al., 2022). Moreover, in many sectors - such as textiles -, firms must comply with the environmental regulations of potential markets (Macchion et al., 2016).

Conversely, other scholars caution that internationalization may hinder decarbonization efforts (Shen et al., 2019). From this perspective, large-scale industrial production leads to increased gas emissions and increased consumption of energy and resources, ultimately exacerbating environmental degradation (Li et al., 2018). Furthermore, research has often shown that enterprises symbolically adhere to regulations and stakeholder pressures without necessarily making a concrete commitment to green practices (Haque & Ntim, 2018). Multinationals often relocate pollution-intensive activities to countries with more lenient environmental regulations (Copeland et al., 2021). Seeking to reconcile these contrasting viewpoints, some studies have proposed an inverted U-shaped relationship between firms' internationalization level and sustainability efforts (Sorroche-del-Rey et al., 2022). According to this perspective, environmental degradation tends to rise in the early stages of business expansion, as sustainability is not initially prioritized. Thereafter, increasing revenues and mounting international pressure place greater emphasis on environmental protection, thus leading to adopting green practices and emission monitoring systems (Tisdell, 2001; Vincent, 1997).

Purpose of the paper. *The paper explores the relationship between "commitment to decarbonization" beyond the firms' boundaries and the dynamics of internationalization. Given the potential impact of circularity on decarbonization efforts, it is increasingly important to address their challenges holistically. This aligns with prior research emphasizing how fostering orchestrated exploration across complex ecosystems is essential for enabling innovation-led transformation (Baglieri et al., 2012). From a circularity perspective, this means designing processes that minimize waste and energy consumption from the outset, using advanced technologies and sustainable inputs to reduce the carbon footprint of production. Closed-loop supply chains, a cornerstone of the circular economy, often require global sourcing and integration of advanced technologies and capabilities, highlighting the role of coordinated activities in creating competitive advantage. Similarly, integrating supply and value chains is pivotal in driving the environmental transition, particularly in facilitating systemic innovation and decarbonization. Even more than in other emission reduction initiatives, it is then important to foster innovative problem-solving and adaptation to global challenges (Fleming & Sorenson, 2001; Marino & Quatraro, 2023; Orsatti et al., 2020) through the cross-pollination of ideas and expertise as well (Barbieri et al., 2020; Zeppini & van Den Bergh, 2011).*

Specifically, we are interested in which internationalization modes might characterize emission reduction initiatives more significantly. Following the Corporate Value Chain Accounting and Reporting Standard, we refer to:

a) *Scope 3 emissions: all indirect emissions that occur in the value chain of the reporting company, such as the production of purchased products, transportation of purchased products, or use of sold products, excluding the use of purchased energy sources);*
b) *Upstream Scope 3 emissions: those indirect emissions that refer to the company's upstream activities;*
c) *Circularity-related categories: those Scope 3 activities that map into the circular economy principles for reducing GHG emissions (see Table 1).*

Methodology. *To build our research design, we collect information on listed private active Italian companies that are engaging in sustainability reporting. This approach limits potential selection bias related to non-financial reporting as it focuses on those companies affected by the Non-Financial Reporting Directive - NFRD (2014/98/EU). The regulation requires large public-interest entities - such as listed companies, banks, and insurance companies with their headquarters in the EU - to disclose in their management report relevant and material information and relevant non-financial key performance indicators concerning environmental aspects, social and employee-related matters, respect for human rights, anti-corruption and bribery issues, and diversity on the boards of directors.*

We derive ESG-related and financial company information from Refinitiv Eikon, one of the most comprehensive commercial databases. Refinitiv Eikon collects data from publicly available sources, including company websites, annual reports, and corporate social responsibility reports or contributed by firms. The database also elaborates on ESG Scores, designed to transparently and objectively measure a company's relative ESG performance, commitment, and effectiveness across different themes (emissions, environmental product innovation, human rights, shareholders, and so on). Then, we cross-reference this sample with Moody's AIDA databases to reconstruct information on the structure of the corporate groups, ownership linkages, and information on C-level management members. Our final sample contains 117 companies spanning different sectors and active between 2012 and 2024.

We explore the effects of international dynamics modes over different dimensions of commitment to decarbonize companies' value chains, thus operationalizing the value-chain emission reduction initiatives through multiple dependent variables (Tab. 3). In detail, we build a set of indicators that takes a value of 1 if the company discloses its emissions in the category and zero otherwise. As reporting of any Scope 3 activity is still voluntary and hard to monitor, we argue that firms that these variables proxy for a more substantial commitment to climate change (Albitar et al., 2023). On the other hand, internationalization represents an articulate phenomenon with layers of components that vary with contexts, and over time, it needs to be explored at different levels and across different streams (Antràs, 2020). Thus, we decline the extent of cross-border activities through either a) scale-based indicators - quantifying the magnitude of such activities - b) scope-based indicators - capturing qualitative aspects of the phenomena - and c) attitudinal and experiential indicators connected to top management. These indicators contribute to a comprehensive view of internationalization, revealing its extent and operational complexity, examining the extent and depth of internationalization, the distribution of markets, and the cultural and physical distances between markets.

For our empirical exercise, we specify our main regression models as linear regression with multiple fixed effects at the year and industry level (Correia, 2017).[1] *All cross-sectorial variation is absorbed by the constant term and the use of robust standard errors also accounts for the fact that error terms might differ across industries. To mitigate concerns about reverse causality and enable comparison across dimensions, we use a 1-year lag of normalized control variables that could affect the commitment to decarbonization: total value of assets, return on equity, and leverage ratio, because larger firms with low growth potential, more financial slack, more profit, and higher revenues tend to commit more resources to improve corporate environmental performance (see, for example, (Maksimov et al., 2019). We summarize the detailed variables, their operationalization, and related data sources in Table 4.*

Results. *Descriptive statistics and correlation among the main explanatory variables are in Table 5, while Table 6 shows the main results of our regression model. Firstly, we tested the effect of different internationalization dynamics on "commitment to decarbonize". Regarding the ownership structure, all dimensions show a lower probability of committing to decarbonization than independent domestic companies with different magnitudes and levels of significance for different dependent variables. This suggests that ownership internationalization alone does not necessarily create incentives for sustainability and may instead reflect divergent governance priorities, less sensitivity to host-country norms, or reduced pressure from local institutions.*

On the contrary, the Degree of Internationalization (DOI) manifests a positive relationship in almost all model specifications. At the same time, the C-level managers' cultural diversity has a positive significant relation only when considering the commitment to reporting Scope 3 emissions. Similarly, engagement in outward FDI - measured either as depth or breadth - only shows a significant correlation for the Scope 3 categories.

We further explore whether heterogeneity in internationalization modes relates differently to the probability of companies registering any reduction in GHG emissions: results in Table 7 do not reveal any significant relationship. Finally, we explore potential heterogeneity relating to the industry in which companies act. In fact, internationalization modes may have different impacts on firm's decarbonization commitment depending on whether they operate in service sector or manufacturing industries, where emissions are tied directly to operations, regulatory pressures, and supply chain dynamics. For service firms, emissions reduction strategies (e.g., switching to renewable electricity, reducing air

[1] As a robustness check, we also conducted a Poisson pseudo-likelihood regression for the dichotomous dependent variables. Results are consistent with the linear specification and available upon request.

travel) are easier to scale globally and less dependent on relationships to international dynamics, while manufacturing firms are more exposed to complex trade-offs between emissions reductions, cost competitiveness, and regulatory compliance. According to our expectations, we identify our main results as being driven by companies in the service sector.

Research limitations. *Current limitations refer to the limited universe of companies included in the analysis, mainly due to data availability limitations. First, we include only listed companies subjected to compulsory non-financial reporting to limit selection bias and lift the computational burden for accessing the harmonized dataset. For many companies, we have only had information on ESG reporting for a few years. Furthermore, we restricted our analysis to the Italian companies because of limited access to Moody's AIDA database to reconstruct detailed information on ownership and management members. Consequently, the sample size also limits our ability to address the potential heterogeneity across sectors, specifically to idiosyncrasies related to more fine-grained analysis in differentials within and between service industries and hard-to-abate manufacturing sectors. Overall, the main limitations stem from the inherent nature of sustainability reporting and the voluntary disclosure of Scope 3 emissions. The Corporate Sustainability Reporting Directive (CSRD) - which takes effect in the 2024 financial year - will expand the audience required to disclose non-financial information and facilitate broader comparisons.*

On another note, we disclose that information about the ownership structure and senior management pertains to the most current data available. Nevertheless, we are confident that these phenomena typically demonstrate gradual changes over time, and our timeframe is limited to the past ten years. Further implementation may involve reconstructing the careers of current and former managers to enhance the understanding of socio-cognitive capabilities, such as attitudes and experiences. Finally, GVC participation is a phenomenon that is particularly relevant to the aspect of firm behavior in sustainability transition choices. As the globalization of markets has significantly expanded international trade, it has fostered the integration of supply chains across nations and enabled companies to optimize production processes based on cost efficiencies and resource availability. Key conceptual aspects underline the relevance of firm-level foreign trade data and the flows of intermediate goods to analyze global value chains.

Managerial implications. *The literature has widely explored that international exposure - whether as independent domestic companies, foreign subsidiaries, or via diverse internationalization modes - can affect the commitment and implementation of net-zero initiatives. However, the results in scientific literature seem inconsistent and sometimes counterintuitive. We argue that these calls for tailored analyses of decarbonization strategies that address the challenges and opportunities of each type of international engagement. In doing so, we also call for differentiating between companies' stated commitment to decarbonization and the actual reduction in GHG emissions. The disconnection might not necessarily be seen as a greenwashing initiative, but it might represent different stages of net-zero transitions. In this regard, identifying and bridging this gap might be important by linking strategic pledges with concrete operational changes and continuous performance. Finally, we highlight the importance of rich and diverse human capital and talent for the net-zero transition commitment. A multicultural executive team can bring varied perspectives that might support innovative and effective decarbonization strategies. The intrinsic nature of net-zero transition - complex, systemic, urgent, and directional (Pinske et al., 2024) - calls for original and flexible solutions for tackling the issue.*

Originality of the paper. *A recent theoretical framework suggests incumbent firms can overcome the input, process, and output challenges encountered during the net-zero transition using four key innovation levers: recombinative, collaborative, integrative, and socio-cognitive capabilities. Together, these capabilities enable firms to effectively tackle the constraints related to achieving net-zero goals (Pinkse et al., 2024). In this paper, we build on this framework by addressing internationalization as a transversal enabling strategy to break path dependency and lock-in processes related to net-zero innovation. This study advances the understanding of internationalization and corporate sustainability by integrating multiple dimensions of foreign exposure with firms' commitment to decarbonization and circularity. Unlike prior research that often focuses on a single measure of internationalization (e.g., foreign sales ratio or number of subsidiaries), we take a holistic approach, examining the extent and depth of internationalization, the distribution of markets, and the cultural and physical distances between them. By doing so, we provide a more nuanced view of how internationalization might shape sustainability efforts. Our approach is exploratory rather than prescriptive: rather than pre-selecting specific dimensions of internationalization, we analyze their differentiated effects on key corporate outcomes, including performance, participation in international value chains, formal ownership structures, and attitudinal shifts. This comprehensive perspective allows us to capture the operational complexity of internationalization and its implications for sustainability, offering new insights into how firms navigate global challenges while advancing environmental commitments. We further contribute by highlighting the difference between commitments to decarbonization and the actual outcomes achieved. Although many companies publicly announce their sustainability goals and set ambitious targets, a significant gap often exists between these commitments and the real reductions in GHG emissions. Our paper aims to explore this disconnection by analyzing both the strategic indicators of decarbonization commitment and the practical challenges of applying circularity and low-carbon innovations. This examination is crucial, indicating that firm decarbonization pledges do not necessarily lead to measurable environmental performance.*

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Tables and Figures

Tab. 1: Connecting the circularity principles to the GHG Emissions Protocol Standards

Scope 3 Emissions	*Categories*	*Circularity-related principles*
Upstream emissions		
	Purchased goods and services	*Design out waste and pollution*
	Capital goods	
	Fuel- and energy-related activities (not included in scope 1 or scope 2)	*Design out waste and pollution*
	Upstream transportation and distribution	
	Waste generated in operations	*Keep products and materials in use*
	Business travel	
	Employee commuting	
	Upstream leased assets	
Downstream missions		
	Downstream transportation and distribution	
	Processing of sold products	*Design out waste and pollution*
	Use of sold products	*Design out waste and pollution*
	End-of-life treatment of sold products	*Keep products and materials in use*
	Downstream leased assets	
	Franchises	
	Investments	

Tab. 2: Dependent variables. Descriptive statistics

Variable	*Obs.*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Scope 3 Commitment	*770*	*0.34*	*0.48*	*0*	*1*
Value-chain Commitment	*771*	*0.32*	*0.46*	*0*	*1*
Upstream Commitment	*771*	*0.31*	*0.46*	*0*	*1*
Circularity-related Categories Commitment	*771*	*0.25*	*0.43*	*0*	*1*
Scope3 emissions reduction	*265*	*0.43*	*0.50*	*0*	*1*
Upstream emissions reduction	*241*	*0.25*	*0.43*	*0*	*1*
Circular emissions categories reduction	*189*	*0.35*	*0.48*	*0*	*1*

Tab. 3: Exploratory variables. Descriptive statistics

	Obs.	*Mean*	*Std. Dev.*	*Min.*	*Max.*
DOI	*1582*	*26.79*	*15.52*	*0*	*100*
Managers' cultural diversity	*1568*	*0.86*	*0.13*	*0.36*	*1*
Outward FDI concentration	*1582*	*0.29*	*0.31*	*0*	*1*
Outward FDI scope	*1582*	*23.57*	*23.72*	*0*	*100*
Total assets	*1084*	*3.65*	*13.27*	*0*	*100*
Total debt % Total Capital	*1084*	*6.31*	*5.69*	*0*	*100*
Return on Equity	*1064*	*38.35*	*4.62*	*0*	*100*

Tab. 4: Descriptive statistics and correlation matrix

		(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
(1)	*DOI*	*1*						
(2)	*Managers' cultural diversity*	*-0.26**	*1*					
(3)	*Outward FDI concentration*	*-0.12**	*-0.06*	*1*				
(4)	*Outward FDI scope*	*0.44**	*-0.08**	*-0.40**	*1*			
(5)	*Total assets*	*0.37**	*-0.26**	*-0.06*	*0.29**	*1*		
(6)	*Total debt % Total Capital*	*-0.04*	*-0.29**	*0.25**	*-0.07*	*0.13**	*1*	
(7)	*Return on Equity*	*-0.03*	*0.08*	*0.01*	*-0.06*	*-0.07*	*-0.08**	*1*

** p < 0.01.*

Tab. 5: Main results. Commitment to decarbonization

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Scope 3 emissions		Value-chain differentiations in activities		Upstream emissions		Circularity-related categories	
MNE	-0.0100	-0.0747	-0.1157*	-0.1197	-0.1089*	-0.1186	-0.1352**	-0.1303*
	(0.885)	(0.394)	(0.066)	(0.128)	(0.084)	(0.133)	(0.029)	(0.092)
Domestic subsidiary	-0.0892	-0.1272	-0.1935***	-0.1666**	-0.1850***	-0.1638**	-0.2288***	-0.2341***
	(0.199)	(0.139)	(0.005)	(0.041)	(0.007)	(0.046)	(0.000)	(0.002)
Foreign subsidiary	-0.2868***	-0.4059***	-0.2891***	-0.2811***	-0.2344***	-0.2521**	-0.1687**	-0.1920*
	(0.002)	(0.000)	(0.001)	(0.007)	(0.006)	(0.021)	(0.035)	(0.060)
DOI	0.0028*	0.0019	0.0042***	0.0058***	0.0046***	0.0060***	0.0037***	0.0065***
	(0.083)	(0.341)	(0.003)	(0.002)	(0.001)	(0.001)	(0.009)	(0.000)
Managers' cultural diversity	0.2991*	0.5929***	0.0247	0.0825	0.0044	0.0829	0.1690	0.2500
	(0.061)	(0.003)	(0.866)	(0.636)	(0.976)	(0.635)	(0.241)	(0.142)
Outward FDI concentration	0.1413**	0.1788*	-0.1171**	-0.1390	-0.1333**	-0.1382	-0.0805	-0.1077
	(0.035)	(0.084)	(0.050)	(0.105)	(0.025)	(0.108)	(0.161)	(0.209)
Outward FDI scope	0.0037***	0.0035***	-0.0001	-0.0003	-0.0003	-0.0005	0.0012	0.0001
	(0.000)	(0.002)	(0.913)	(0.790)	(0.689)	(0.659)	(0.135)	(0.907)
Total assets		0.0065***		0.0009		0.0010		0.0017
		(0.000)		(0.384)		(0.376)		(0.125)
Total debt % Total Capital		0.0027		0.0019		0.0014		0.0010
		(0.336)		(0.468)		(0.604)		(0.676)
Return on Equity		-0.0007		-0.0054		-0.0068		0.0014
		(0.885)		(0.241)		(0.153)		(0.771)
Constant term	-0.0718	-0.2678	0.3652**	0.4886*	0.3705**	0.5418**	0.1543	0.0092
	(0.663)	(0.366)	(0.012)	(0.056)	(0.011)	(0.038)	(0.309)	(0.971)
Sector F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.378	0.412	0.402	0.376	0.394	0.367	0.370	0.366
Chi-2 statistics	10.815	15.879	6.930	4.414	6.182	3.954	7.861	6.459
Observations	758	607	759	608	759	608	759	608
Std.Err	robust	robust	robust	robust	robust	robust	robust	robust

*P-values in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.*

Tab. 6: Main results. Probability of reducing emissions

	(1)	(2)	(3)	(4)	(5)	(6)
	Scope 3 emissions		Upstream emissions		Circular categories	
MNE	0.2393*	0.1441	0.1333	0.0891	-0.0652	-0.0902
	(0.069)	(0.322)	(0.226)	(0.447)	(0.681)	(0.630)
Domestic subsidiary	0.2672*	0.1476	0.1654	0.1503	0.0608	0.0248
	(0.080)	(0.366)	(0.148)	(0.221)	(0.725)	(0.895)
Foreign subsidiary	-0.0064	-0.0743	0.1568	0.0833	0.0681	0.0703
	(0.988)	(0.864)	(0.542)	(0.757)	(0.846)	(0.857)
DOI	0.0031	0.0050	-0.0010	-0.0020	0.0040	0.0051
	(0.355)	(0.252)	(0.737)	(0.659)	(0.296)	(0.288)
Managers' cultural diversity	-0.4297	-0.3608	0.3020	0.3237	0.6101	0.4141
	(0.332)	(0.459)	(0.427)	(0.422)	(0.232)	(0.464)
Outward FDI dispersion	0.2692**	0.0859	0.0683	0.0752	0.1369	-0.0277
	(0.044)	(0.648)	(0.604)	(0.696)	(0.414)	(0.904)
Outward FDI scope	0.0010	-0.0011	0.0010	0.0007	0.0022	0.0003
	(0.607)	(0.625)	(0.574)	(0.756)	(0.322)	(0.910)
Total assets		0.0016		0.0018		0.0017
		(0.529)		(0.497)		(0.554)
Total debt % Total Capital		0.0108		-0.0006		0.0082
		(0.621)		(0.975)		(0.778)
Return on Equity		0.0005		-0.0052		-0.0138
		(0.960)		(0.680)		(0.468)
Constant term	0.3678	0.3587	-0.1565	0.0746	-0.3892	0.3317
	(0.304)	(0.545)	(0.614)	(0.896)	(0.327)	(0.699)
Sector F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.074	0.066	-0.012	-0.012	0.002	-0.024
Chi-2 statistics	2.211	0.835	0.705	0.384	1.166	0.568
Observations	261	220	237	197	185	158
Std.Err	robust	robust	robust	robust	robust	robust

*P-values in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.*

Tab. 7: Heterogeneity across types of sectors for commitment to decarbonize: manufacturing vs service companies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Scope 3 emissions		Value-chain differentiations in activities		Upstream emissions		Circularity-related categories	
	Manufacturing	Services	Manufacturing	Services	Manufacturing	Services	Manufacturing	Services
MNE	0.2312**	-0.2276**	-0.0567	-0.1680*	-0.0620	-0.1680*	0.0873	-0.2110**
	(0.030)	(0.046)	(0.688)	(0.061)	(0.661)	(0.061)	(0.533)	(0.022)
Domestic subsidiary	0.2389**	-0.2887**	0.0985	-0.2962***	0.0955	-0.2962***	0.0197	-0.3184***
	(0.013)	(0.016)	(0.491)	(0.002)	(0.506)	(0.002)	(0.881)	(0.001)
Foreign subsidiary	0.4073*	-0.8042***	0.4351*	-0.6175***	0.4251*	-0.6175***	0.1853	-0.5086***
	(0.057)	(0.000)	(0.063)	(0.000)	(0.071)	(0.000)	(0.418)	(0.000)
DOI	-0.0070**	0.0048**	-0.0033	0.0086***	-0.0032	0.0086***	-0.0019	0.0085***
	(0.017)	(0.039)	(0.334)	(0.000)	(0.360)	(0.000)	(0.559)	(0.000)
Managers' cultural diversity	1.4788***	0.3579	1.1117**	-0.1632	1.1342**	-0.1632	1.3676***	-0.0367
	(0.000)	(0.104)	(0.020)	(0.386)	(0.018)	(0.386)	(0.001)	(0.840)
Outward FDI concentration	0.4439**	0.1378	0.2864	-0.1855**	0.2892	-0.1855**	0.1624	-0.1637*
	(0.012)	(0.226)	(0.233)	(0.040)	(0.232)	(0.040)	(0.475)	(0.084)
Outward FDI scope	0.0060***	0.0047***	0.0040*	0.0002	0.0041*	0.0002	0.0049**	0.0005
	(0.001)	(0.001)	(0.059)	(0.870)	(0.054)	(0.870)	(0.017)	(0.752)
Total assets	0.0486*	0.0046***	0.0535***	-0.0010	0.0444**	-0.0010	-0.0118	0.0004
	(0.051)	(0.000)	(0.007)	(0.416)	(0.037)	(0.416)	(0.568)	(0.779)
Total debt % Total Capital	0.0121	0.0057*	0.0113	0.0048*	0.0094	0.0048*	0.0076	0.0034
	(0.411)	(0.094)	(0.515)	(0.076)	(0.587)	(0.076)	(0.630)	(0.193)
Return on Equity	0.0048	-0.0009	-0.0051	-0.0045	-0.0078	-0.0045	0.0089	-0.0049
	(0.430)	(0.907)	(0.466)	(0.484)	(0.294)	(0.484)	(0.238)	(0.435)
Constant term	-1.6094***	-0.0285	-0.7132	0.6144**	-0.6177	0.6144**	-1.4852***	0.4937
	(0.000)	(0.941)	(0.227)	(0.050)	(0.303)	(0.050)	(0.002)	(0.106)
Sector F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.517	0.373	0.407	0.400	0.389	0.400	0.397	0.377
Chi-2 statistics	4.086	36.062	2.059	8.465	1.581	8.465	2.337	8.409
Observations	309	298	309	299	309	299	309	299
Std.Err	robust	robust	robust	robust	robust	robust	robust	robust

*P-values in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.*

Sustainability in Retail:
A framework, review and future research agenda

GENNI PERLANGELI[1]

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Abstract

This research aims to review the extant literature on sustainability and to conduct a comprehensive analysis of research in this emerging field.

Accordingly, this paper synthesizes the literature in terms of theories, contexts, characteristics, and methodology to analyze sustainability research development over time. The literature review is an important part of any research project and shows that sustainability has transitioned from different highlights.

Specifically, this paper analyzes the overview of literature related to a keyword/ title/abstract/ theory/ method using by a four-step technique: 1) the dominant definitions of sustainability (and related concepts) and its evolution over time, 2) the characteristics of sustainability elements after searching for academic publications in the database (Scopus) and selecting publications based on their relevance for the stated aims, 214 studies have been included in the review; 3)selected studies with the dominant definition as corporate social responsibility (CSR) and as green;4) studies selected and identified in the differences between the sustainability approaches (consumer approach and analytical approach).

Results show that the definition of sustainability has changed over time and in different approaches according to the growing relevance of the retail system. This study allows a classification and schematization of recent articles. It provides a synthesis of the body of knowledge so far produced in the field of sustainability; as such, it has important implications for managers, scholars, and students.

Keywords: sustainability, review, retail.

Framing of the research. *This paper is based on a literature review (Fink, 1998; Thorpe et al., 2005, Tranfield et al., 2003) and evaluates the extent to which the process can be applied to the sustainability field to produce a reliable knowledge stock and enhanced practice by developing context-sensitive research.*

The paper highlights the challenges in developing an analysis with an appropriate methodology about the role of sustainability in this literature overview and is related to a keyword/ title/abstract/ theory/ method prior studies to strengthen the foundation of knowledge.

Sustainability includes a variety of interrelated issues. Some articles investigate how far sustainable practices and circular economy concepts have been implemented in retail return systems (Frei, Jack & Krzyzaniak, 2020). Sustainability has become a pillar of the company's strategy, with almost all major companies now having a senior executive, including a vice president with the word "sustainability" in his title. Most large companies now have explicit public statements on sustainability policy and are required to apply a "triple bottom line" that considers the financial, environmental, and social benefits firm (Elkington, 1998). In many circles, "corporate sustainability" has become synonymous with "Corporate social responsibility" and sustainability. Companies that include sustainability aspects in their strategies can become even more competitive (Christmann, 2000; McGee, 1998).

Others instead examine through prior studies the opportunities and solutions through conservation of value, tracking of goods, processing time, internal and external fraud, customer brand perception, corporate social responsibility (CSR), and sustainability. There is an important correlation between corporate responsibility and retail decisions on both social and environmental dimensions, in a key role in the overall performance of CSR (Carbone, Moatti, & Vinzi, 2012). Sustainability has a holistic vision (Hall,2002), it has different dimensions, environmental and social, and is, therefore, very close to aspects that are combined with it, such as, in other words: green, CSR, supply chain, AI, and best practices.

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Purpose of the paper. *The term sustainable development was first coined at the United Nations Conference on the Human Environment in 1972 (Hall et al.,2010) and the opportunities to study sustainability received wide attention with the Brundtland report in 1987. Sustainability has become a major issue in recent years, and its impact extends to many areas: environmental, social, and economic (Kemper et al., 2019). There has been a consequential growth in "green," "social," "CSR", "environment," "sustainable," "ESG (environment, society, and governance)" marketing, which has focused on the consumer approach and on an analytical approach (Dangelico Vocalelli,, 2017). For this reason, it is important to try to define the various aspects in the different years especially in retail.*

Methodology. *This paper is based on a systematic literature review (Fink, 1998; Thorpe et al., 2005) a methodology which differs from conventional reviews in that it aims at "synthesizing research in a systematic, transparent, and reproducible manner" (Tranfield et al., 2003: 207) and kept the first algorithm in the analysis. The first research was about systematic literature review between 2000 and 2025, and 214 scientific articles published in peer-reviewed academic journals were included.*

Data collection

Scopus	
Search in:	*Article Title, Abstract, Keywords*
Document type:	*Article*
Subject area:	*Business, management and accounting; social sciences; environmental science; economics and finance.*
Data range:	*2000-2025*
Language:	*English*

Sustain, retail*,review**

(TITLE-ABS-KEY (sustain) AND TITLE-ABS-KEY (retail*) AND TITLE-ABS-KEY (review*)) AND (LIMIT-TO (SUBJAREA, "BUSI")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (LANGUAGE, "English"))*

The evaluations were based on the peer review method and, for articles in the bibliometric areas indexed on the Scopus databases, on bibliometric analysis.

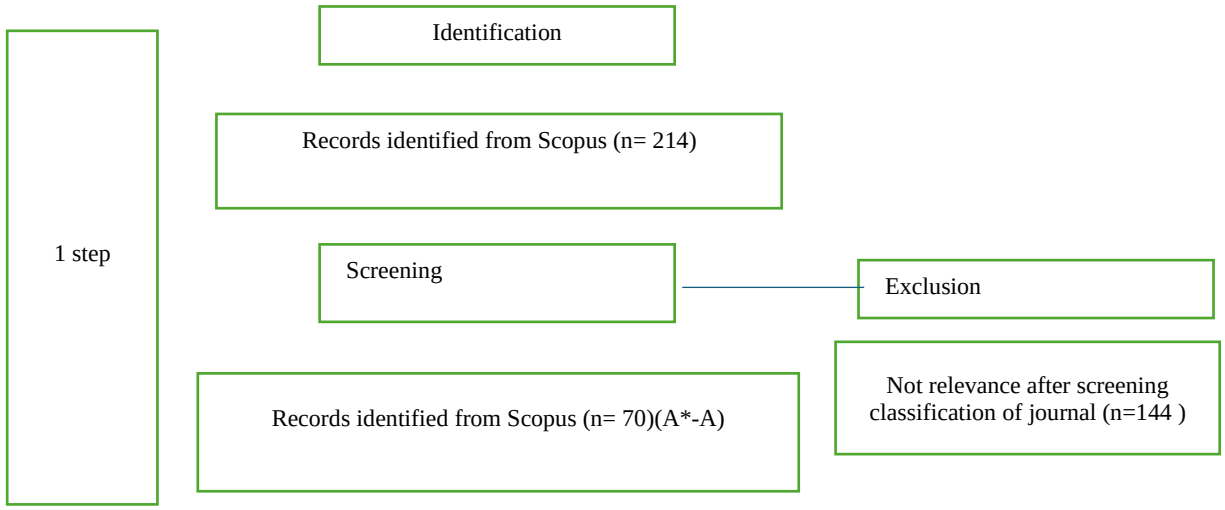
After emerging, the results carried out the first screening by analyzing the title, journal, and abstract of the articles and considered relevant papers with the classification about ABDC Journal Quality Guide Australian Business Deans Council, which increased rapidly over recent years (Azar and Brock 2008). ABDC was compiled using elements of the methods used in institutional lists, peer surveys, and citation studies (Morris et.al.., 2009).

Journal quality was operationalised based on the classification ABDC ranks journals based upon an A, A, B, and C classification scheme; A* in the ranking is considered "highest quality". This research, focused on the approach using Management and Marketing journals. The quality assessment of journals is carried out by panels of experts and there are internationally recognized and externally validated journal classification lists on appropriate metrics selected for citation.*

Journal quality has been an important component of performance and the evaluation of results.

After merging the results, the first screening selected all the documents reviewed, presented in Fig. 1, adapted from PRISMA flow diagram template (Page et al., 2021).

Fig. 1: Procedure for selecting (2000-2025) articles to be reviewed.



The distribution of the articles by year and journal is in Table 1. There is a period of an interesting trend, with a number of contributions concentrated in the period 2020- 2025. A total of 29 different journals are presented in A and A categories. Among studies investigating a specific topic but there are many categories inside it (food, electronic, fashion, AI).*

Tab. 1: Table 3. Number of articles included in the review per each journal and number of contributions concentrated in the years 2000-2025 (A-A)*

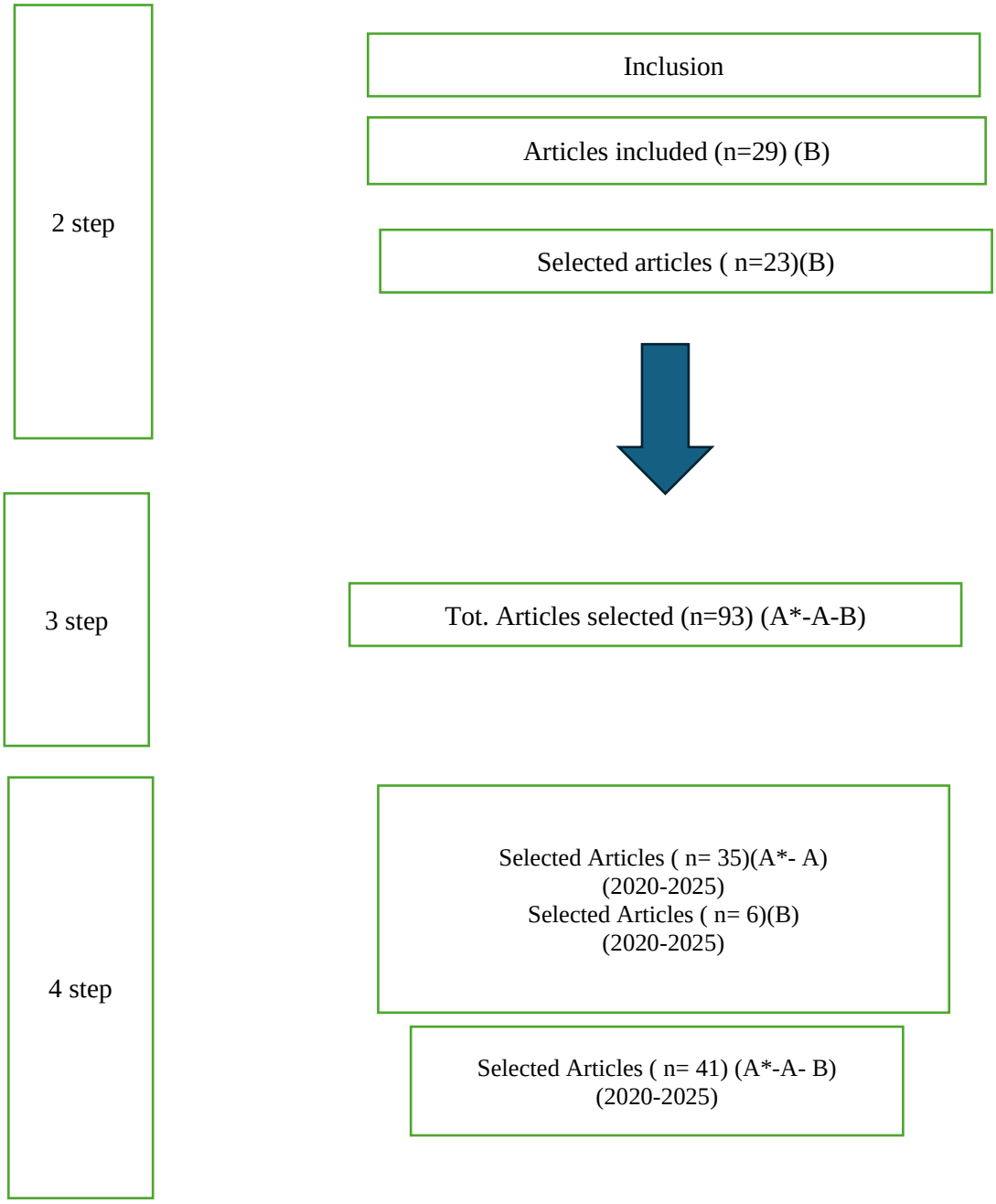
Journal	Period																									Total
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Asia Pacific Journal of Marketing and Logistics																								1			1
Australasian Marketing Journal																									1		1
Business Strategy and the Environment																					2	1					3
Decision Support Systems																							1				1
Economic and Industrial Democracy																			1								1
Industrial Management and Data Systems																		1									1
International Journal of Bank Marketing																									1		1
International Journal of Consumer Studies										1															1		2
International Journal of Logistics Management																								1			1
International Journal of Market Research																										1	1
International Journal of Physical Distribution and Logistics Management																						1					1
International Journal of Production Economics																			1								1
International Journal of Retail and Distribution Management					1	1			1	1	2	1	1				2			1			2	1	3		17
International Review of Management and Marketing																									1		1
Journal of Business and Industrial Marketing							1																				1
Journal of Business Ethics																					1						1
Journal of Cleaner Production															1			2	4	1	2	1	3	2	1	1	18
Journal of Consumer Marketing	1																								1		1
Journal of Retailing									1									1									2
Journal of Retailing and		1																				1				1	3
Marketing Intelligence and							1																		1		2
Marketing Intelligence and								1																			1
Production and Operations																				1							1
Production Planning and Control															1									1			2
Public Relations Review															1												1
Supply Chain Management																	1										1
Systems Research and															1												1
Tourism Management	1																										1
Transportation Research Part E: Logistics and Transportation																										1	1
Totale																					5	4	6	6	10	4	70

The marketing articles in A- A -B -C in the marketing field are a total of 52 articles in the years 2000-2025.*

Presenting the breakdown of the articles in a year is the first step. In the second step, selected research articles were published between 2020 and 2025 in A and A 35 documents. During the selection process, considering the focus of this study, non-relevant articles were identified as follows. Also, papers focused on sustainability and retailing were considered. For each study included in the systematic review, data from the full text were extracted. These data included authors, publication name, year of publication, titles, this study's research questions that have been addressed, and main results relating to this study's research question. These data were the starting point for the following analysis.*

The total of documents classified in Journal B is n. 29, selected n.23, but the articles in the years 2020-2025 are numb. 6. The total number of articles examined is 29 (A-A), and in total, n.35 (A*-A- B). Selected articles total 41 (A*-A-B) in 2020- 2025y.*

Fig.2. Procedure for selecting (2020 - 2025) articles to be reviewed



There are different areas of research about sustainability; in fact, "sustainability" has become a pillar of corporate strategy. The term " sustainability " has become synonymous with "Corporate social responsibility" (CSR).

In recent years, we have been interested in sustainability programs. The phenomenon of CSR has created a growing number of publications on the subject of sustainability and retail in specialist journals such as the Journal of Retailing and Consumer Services, the Journal of Fashion Marketing and Management, Business Strategy and the Environment, and International Journal of Retail and Distribution Management.

Based on the above, the selection is organized as follows because there are different aspects of sustainability and this contribution presents different approaches: consumer approach, company approach, and competitive advantage approach (performance).

To date, most of the literature on sustainability has focused on companies, and this has somewhat affected the competitive advantage, but a careful analysis should be done on the words around sustainability. For example, we find the keyword "green" next to the word sustainability, which has a consumer approach vision; in fact, it encapsulates environmental responsibility, which determines a series of "unique opportunities to increase revenues."

The next step is to address how customers are influenced by a company's green image and then clarify the differences between customers if they are aware of performance through offering green products but not through environmental performance. This is close to a consumer approach. It is also important to see the keywords CSR and sustainability, aimed

especially at the structure of the company, and this analysis is useful in analyzing the purchasing policies of public and private retailers in different sectors. This is a closed consumer and competitive approach.

In this section, performance parameters and indicators are utilized for science mapping. These results are drawn from the entire literature extracted from the Scopus database. To begin with, the parameters utilized in this phase are derived from various visualizations that allow us to see the words used by researchers in the context of consumption phenomena. These graphs act as supplementary tools to demonstrate the significance attributed to these selected words with the specific keywords (Fig.3) and specific field (Fig.4).

Fig. 3: Science Mapping of keywords Scopus Database (2000-2025y)

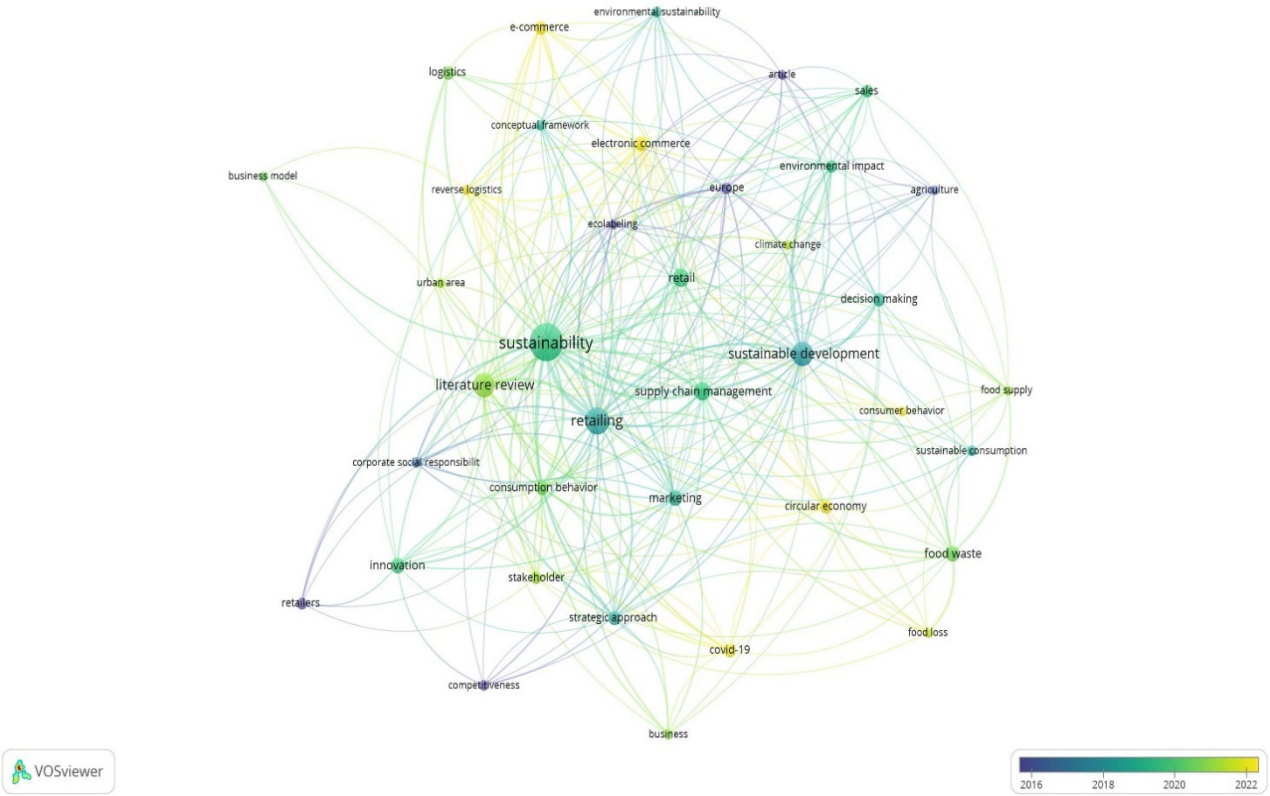
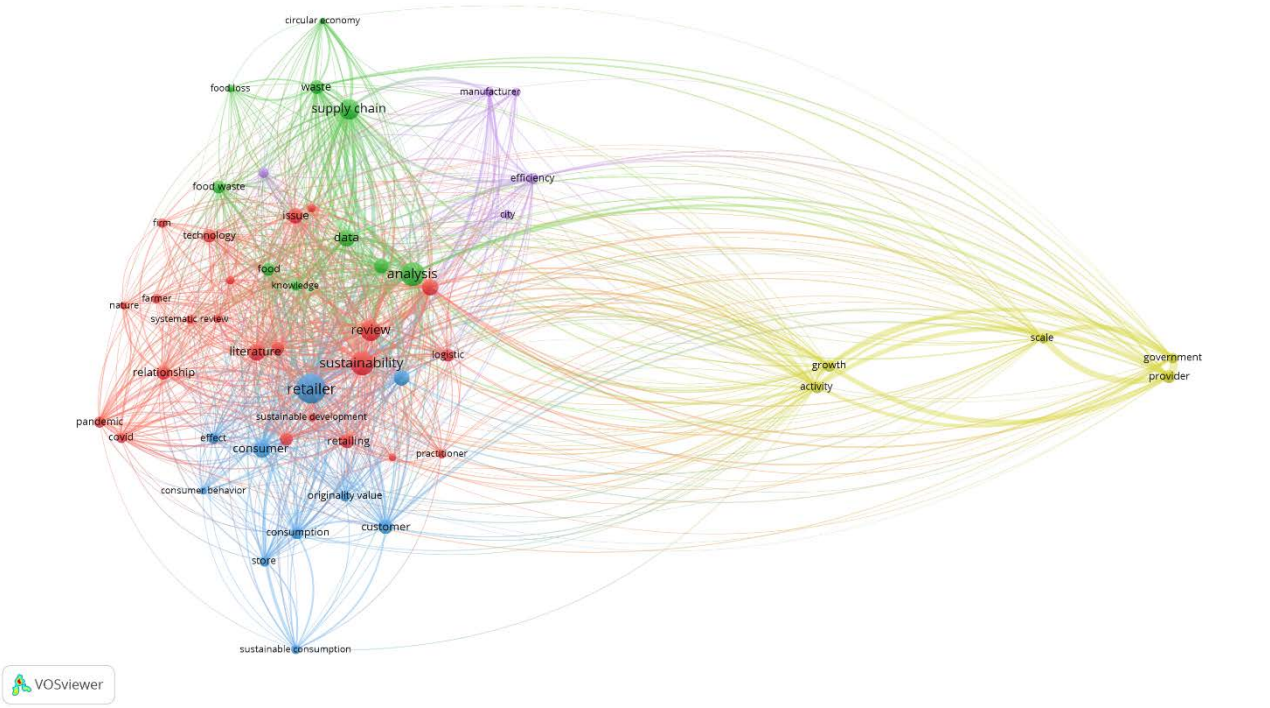


Fig.4: Science Mapping of keywords field of Journals - Scopus Database (2000-2025y)



Results. *The research on sustainability has shifted to different aspects and sectors. These have concern above all the consumers, the companies, the performances through the theme of CSR and green, in the private or public company and performance. In a perspective of sustainable development, oriented towards a triple fund (economic, environmental and social), it will be interesting to examine the performance of stores and the relationship with economic performance, but this is not at the time of this topic***.** *The green aspect (environmental sustainability) and the CSR aspect (environmental sustainability) are closely related, but they have some particularities that distinguish them. Both relate to business practices and policies that seek to respond to social, environmental, and economic challenges but do so with different focuses. The second step of analysis focuses on peer-reviewed academic journal papers written in English and published from January 2020 to March 2025, which is the period when studies on CSR are extended and explore the economic, social, and environmental concept of sustainability (Margolis & Walsh, 2003).*

Tab. 2: Overview of previous systematic reviews selected as references for this study

Authors	Keywords	Purpose	Method	Context
Mondal J.; Chakrabarti S.	Brand experience; e-tail brand experience; Enjoyment in online shopping; Etailscape; Interpretive structure modeling; Mobile shopping; Physical evidence in e-commerce	MICMAC (Matrix Impact Cross-Reference Multiplication Applied to a Classification) approach this study attempts to address this gap by investigating the factors which form the BX in an app-based online retail environment (eRBX) .	Literature review -Using ISM (interpretive structure modeling) and the MICMAC (Matrix Impact Cross-Reference Multiplication Applied to a Classification) approach, A literature review on BX and a collection of responses from 33 domain experts led to the identification of 20 factors and the showcasing of a multilevel interpretive relational structure of eRBX.	technology, sustainable eRBX, marketing investments accordingly.
Mueller S.M.; Kowalczyk C.M.; Taillon B.J.; Rowe W.J.	Farm waste; Gleaning; Product innovation; Supply chain platform	Farm waste, supply chain, gleaning	Supply chain platform, multi method approach, Gleaning Innovation Framework (interviews and surveys)	Innovation products, gleaning, farm waste, multi method approach, interviews, surveys food supply, gleaning innovation process.
Arun T.M.; Kaur P.; Ferraris A.; Dhir A.	green restaurants; sustainability; systematic review; thematic analysis	Green hospitality, green restaurant, consumer behaviour	Thematic, systemathic lit. analysis -content analysis – limitation gaps - four key thematic foci: (a) consumer behavior variables studied, (b) antecedents internal to the consumer, (c) antecedents due to the perception of external factors, and (d) moderators. limitations and gaps -systemathic review 50 research studies published on the consumer adoption of green restaurant services to address this gap accordingly.	Green restaurants, green hospitality, Multiple perspectives, content analysis, limitations and gaps
Robichaud Z.; Brand B.M.; Yu H.	Information asymmetry; Intercultural; Online shopping; Signaling theory; Sustainability; Sustainable clothing	ergonomic situation of logistics workers and present a unique contribution towards the knowledge base in this field due to the multi-perspective approach.	An Adaptive Choice-Based Conjoint experiment involving German online shoppers (n = 332) and Chinese counterparts (n = 331) respondents from Generation Y is conducted about sustainable clothing, price and shipping costs with online customer reviews . This cross-cultural comparison explores consumer preferences for sustainable clothing and analyses factors influencing their choices, including price, shipping costs, sustainability labels and online customer reviews	German and Chinese respondents from Generation Y about sustainable clothing
Putra A.H.P.K.	Bibliometric Analysis; Consumer Behavior; Digital Marketing; E-commerce Strategies; Market Integration; Online-to-Offline (O2O) Commerce; Retail Innovation	Online to Offline (O2O) commerce from 2006 to 2023.	Dynamic evolution of O2O strategies, underpinned by a growing emphasis on customer engagement, technological innovation, and the strategic management of online and offline synergies. The research underscores the transformative potential of O2O commerce in bridging the gap between digital and physical marketplaces, enhancing consumer experiences, and fostering sustainable business practices.	Online to Offline

Another step, has been the analysis highlighted and extrapolated the texts with CSR and sustainability in comparison (Table 3).

Tab. 3: Related (systematic) literature reviews CSR and Sustainability (A-A-B) 2000-2025*

Reference and Method	*Method*	*Perspective*	*Main Results*
Mondal J.; Chakrabarti S.,(2021)	A literature review on Brand Experience (BX) and a collection of responses from 33 domain experts led to the identification of 20 factors and the showcasing of a multilevel interpretive relational structure of the online retail environment (eRBX).	Connects sustainable development with entrepreneurship	Multi-dimensional concepts are further framed into an alternative paradigm of detailscape. This study can help practitioners to understand the insight and anatomy for creating sustainable eRBX, and prioritize marketing investments accordingly.
Frei R.; Jack L.; Krzyzaniak S.-A., (2020)	Structured Interviews- depth interviews in UK (17), 100 retailer website reviews, 3 retail community workshop	Multichannel retail and conflicts between their corporate social responsibility commitments and their returns practices.	Sustainable practices and circular economy concepts have been implemented in retail returns systems;
Jones P.; Comfort D.; Hillier D., (2007)	Literature-based review of CSR, its relationship to marketing and the rationale for growing retail interest in the topic	Analysis is conducted of CSR reports and information posted on the world wide web by the UK's top ten food retailers, followed by participant observation in their largest branch stores in one medium-sized English town.	CSR as a means of communicating with customers while they are in the store.
Du Plessis N.; Grobler A.F., (2014)	Literature review in the first phase	importance assigned to their CRS initiatives	theoretical framework against which the websites and the annual and sustainability reports of three South African retailers were analyzed
Björklund M.; Forslund H.; Persdotter Isaksson M.,(2016)	Literature review on logistics-related environmental considerations, indicators and consciousness about CSR. CSR reports from 12 of the world's largest retailers.	Indicators applied to measure the effects of these considerations and their environmental consciousness in their CSR reports.	Focused on environmentally sustainable logistics in retail chains, and even fewer address how to measure environmental sustainability.
Naidoo M.; Gasparatos A. (2018)	The literature review examines the key drivers for the adoption of CORPORATE ENVIRONMENTAL SUSTAINABILITY (CES) strategies in the retail sector.	Combined with the increasing policy traction of the Sustainable Development Goals (SDGs), and especially SDG 12 on responsible consumption and production,	Adopt different corporate environmental sustainability (CES) actions and strategies in retail system.

Suggest that this stream of research, although complementary, differs by on the CSR of a specific category of retail and their focus on sustainability.

As shown in Table 4, prior to 2000 there were only a few papers in the area of sustainability and retail. However, the situation is changing, with an increasing number of papers being published. Most of the recent ones appeared in relatively new sustainable development/environmental management journals such as International Journal of Retail and Distribution Management (which published fourteen on the topic), International Review of Management and Marketing (which published nineteen articles) and the Journal of Cleaner Production (which published twenty-two articles).

Tab. 4: Publications on sustainability and green select journals in different years and different journals- 2000-2025

	2000-2005	2005-2019	2020-2025
Journal of European Industrial Training	Byrom J.; Harris J.; Parker C.(2000)		
J of Cleaner Production			Alejandra Maldonado Bonilla M.; Bouzon M.; Cecilia Peña-Montoya C. (2024)
			Munir K. (2022)
			Huang I.Y.; Manning L.; James K.L.; Grigoriadis V.; Millington A.; Wood V.; Ward S. (2021)
			Kong L.; Liu Z.; Wu J.(2020)
			Vhatkar M.S.; Raut R.D.; Gokhale R.; Cheikhrouhou N.; Akarte M.(2024)
			Yang Y.; Habib K.; Wood M.O. (2023)
			Irfan A.; Bryła P. (2025)
Business Strategy			Arun T.M.; Kaur P.; Ferraris A.; Dhir A. (2021)
International Journal of Logistics Management			Perotti S.; Colicchia C. (2023)
International Journal of Retail and Distribution Management		Jones P.; Comfort D.; Hillier D. (2008)	
		Björklund M.; Forslund H.; Persdotter Isaksson M. (2016)	

The dissemination of articles on sustainability and green has increased significantly between 2020 and 2025, above all due to the growing awareness of environmental problems and the need to adopt more sustainable practices at a global level (Paris Agreement, 2016). The interest in these issues increased in discussions on the circular economy, CSR, green finance, and sustainability in supply chains (Frei et al., 2020). Consumers have become more informed and concerned about the environmental impact of their consumer choices. This has led to an increasing demand for sustainable products and a greater focus on responsible business practices. Another interesting analysis will be the business and the best practices (White et al., 2025). Green progress, clean energy technologies and sustainable innovations increase the interest in these issues, both in the technological and economic sectors and in behavior research (Walker et al., 2015).

Consumer and Analytical Approach

The consumer approach and the analytical approach represent two distinct perspectives that can be applied in understanding and addressing issues related to sustainability and green practices. The impact of sustainability can be positive for consumers, it is associated with environmental and social sustainability (Eastman et al., 2024). The consumer approach focused on the behavior, preferences, and decisions of individual consumers (Heidenreich et al., 2015; Villagra et al, 2022). This paper aims to assess the current state of sustainability research from a consumer perspective and highlight articles with an analytical approach. Sustainability innovation required an analytical approach, especially in recent years (Yuan et al.,2024).

The next step would be to catalogue how they differ while being on the same topic. This underlines the difficulty of cataloguing sustainability and is one of the reasons why research is emphasized (Luo and Bhattacharya 2006). The aim is to fill the research gap on sustainability and improve understanding through a structured overview of the results of the two approaches underlined.

Tab. 5: Consumer Approach and Analytical Approach (2020 - 2025y)(A-A- B)*

Author	Consumer Approach	Analytical Approach
Mondal J.; Chakrabarti S. (2021)	X	X
Frei R.; Jack L.; Krzyzaniak S.-A. (2020)		X
Pereira A.M.; Moura J.A.B.; Costa E.D.B.; Vieira T.; Landim A.R.D.B.; Bazaki E.; Wanick V.(2022)	X	X
Mueller S.M.; Kowalczyk C.M.; Taillon B.J.; Rowe W.J. (2024)		X
Munir K. (2022)		X
Arun T.M.; Kaur P.; Ferraris A.; Dhir A. (2021)		X
Pasquino M.; Lucarelli C. (2024)		X
Wong C.Y. (2021)		X
Robichaud Z.; Brand B.M.; Yu H. (2024)	X	
Putra A.H.P.K. (2024)		X
Huang I.Y.; Manning L.; James K.L.; Grigoriadis V.; Millington A.; Wood V.; Ward S. (2021)		X
Sharma N.; Sharma A.; Dutta N.; Priya P. (2023)		X
Saha V.; Jebarajakirthy C.; Sreen N.; Goyal P.; Mani V.; Deshpande S. (2024)	X	
Kathuria A.; Bakshi A. (2024)		X
Al-Issa N.; Thanasi M. (2024)	X	
Kong L.; Liu Z.; Wu J. (2020)		X
Perotti S.; Colicchia C. (2023)		X
Xue J.; Liu M.T. (2023)		X
Vhatkar M.S.; Raut R.D.; Gokhale R.; Cheikhrouhou N.; Akarte M. (2024)		X
Yang Y.; Habib K.; Wood M.O. (2023)	X	X
Irfan A.; Bryła P. (2025)		X
Velásquez J.D. (2025)		X
Alexander R.(2025)		X
Ardra S.; Barua M.K. (2022)		X
Gbetchi K.E.; Perrigot R. (2025)	X	X
Marriott J.; Bektaş T.; Leung E.K.H.; Lyons A. (2025)		X
Munro P.; Kapitan S.; Wooliscroft B. (2023)	X	X
Lopes de Sousa Jabbour A.B.; Frascareli F.C.D.O.; Santibanez Gonzalez E.D.R.; Chiappetta Jabbour C.J. (2023)		X
Wang S.; Cheah J.-H.; Lim W.M.; Kumar S.; Lim X.-J.; Towers N. (2024)		X
Myshko A.; Checchinato F.; Colapinto C.; Finotto V.; Mauracher C. (2024)		X
de Moraes C.C.; de Oliveira Costa F.H.; Roberta Pereira C.; da Silva A.L.; Delai I. (2020)	X	X
Cocquyt A.; Crucke S.; Slabbinck H. (2022)	X	X
Fernández-Ríos A.; Laso J.; Hoehn D.; Amo-Setién F.J.; Abajas-Bustillo R.; Ortego C.; Fullana-i-Palmer P.; Bala A.; Batlle-Bayer L.; Balcells M.; Puig R.; Aldaco R.; Margallo M. (2022)	X	X
Lagin M.; Håkansson J.; Nordström C.; Nyberg R.G.; Öberg C. (2022)	X	X
Tran Dinh M.T.; Su D.N.; Tran K.T.; Luu T.T.; Duong T.H.; W. Johnson L. (2022)	X	X
Ramchandani M.; Bhattacharya S.; Coste-Maniere I. (2024)	X	X
Sinha P.; Sharma M.; Agrawal R. (2023)	X	X
Negrutiu C.; Vasiliu C.; Enache C. (2020)	X	X
Natarajan T.; Veera Raghavan D.R. (2025)	X	X
Konhäusner P. (2021)	X	
Aleem A.; Loureiro S.M.C.; Bilro R.G. (2024)	X	X
Veiga C.P.D.; Veiga C.R.P.D.; Michel J.D.S.S.; Di Iorio L.F.; Su Z. (2024)		X

Research limitations. *This paper aims to identify 214 articles published from 2000 to 2025. Reviewed articles dealt with a variety of different approaches, contexts, methodologies and results; most of the contributions focus directly on the issue of retail, but all are linked to some degree to the topic. This article addressed an overview of sustainability in the marketing journals and the passage from CSR and green to sustainability system. This is a limitation of the research., in fact, in the first aspect, it considers only English peer-reviewed journal articles, and in the second aspect, it selects a set of keywords and builds a search algorithm, but this may have excluded other relevant non-indexed works. The period considered in this review extends from 2000 to 2025, but further relevant contributions may have been published before the conduct of this review. Has been used Scopus, thus, future research may consider other databases and journal sources, as well as different keyword combinations. Finally, the provision of a formal process of inclusion and exclusion criteria has made it possible to conduct the review process with high objectivity, but this work is only the first part of a work that includes successive analyses.*

Managerial implications. *The paper offers considerable insights, and there are vast opportunities for further research in this field where it can reveal the relationship in the sustainability framework. As discussed above, one dimension to be analysed and asked is that of the study in sustainable development helps the private and the public sector. This requires advanced and in-depth knowledge along with a range of issues related to a specific sector, the retail development.*

Second, the emergence and legitimization of sustainable development in the economy, the rules of the game are changing, which means that there will be new players, with implications for both incumbent and new actors. Another question is, to what extent, are the established organizations of retail too far removed from sustainable change and scenarios and focusing on successful past routines and skills?

Third, what are the best practices to be considered sustainable? The answers to these questions will help us move forward on the previous issue, which concerns retailers and non-sustainable or unsustainable businesses. While these and related issues require further theoretical and empirical work, the growing literature on sustainability and retail allows us to have a theoretical framework with direct and necessary observations.

Originality of the paper. *Although sustainable development continues to be defined variously and differently, results being an important channel for a more sustainable society, there is still considerable uncertainty about the nature of this role and how it will play. Recent research in the field has been outlined in this analysis. However, while the papers in this special issue provide a major step in this direction, there are still considerable opportunities for further research. Uncertainty about the nature of the role of sustainability could result from an inability to be autonomous but still dependent to other aspects of marketing. Extrapolating some questions in this research also summarized RQ1. Are there differences related to the word sustainability when combined with green or CSR in retailing? RQ 2 To what extent do consumers and practitioners focus on successful past routines and skills that are too far removed from sustainable change and the current scenario? RQ3. To what extent do approaches influence the retail world?*

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Towards a conceptual framework of enabling factors for industrial symbiosis within industrial parks

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Abstract

This study aims to develop a conceptual framework identifying the enabling factors of industrial symbiosis (IS) within industrial parks (IPs) through the lens of the circular economy (CE). To achieve this objective, we employed a systematic literature review (SLR) methodology, analyzing scientific contributions from the Scopus and Web of Science databases. Specifically, we reviewed a collection of 166 studies that met selected criteria to uncover the key drivers facilitating the adoption of IS in IPs. The findings reveal both external and internal factors that enable IS in IPs. Among the external factors, economic conditions and the institutional context emerge as particularly significant. On the other hand, internal factors include organizational capabilities and the characteristics of entrepreneurs. Accordingly, the current research offers valuable and practical insights for policymakers and industrial park managers to what factors leverage in order to promote or enhance the application of IS principles within IPs, thereby contributing to the sustainable development of surrounding areas.

Key words: *industrial symbiosis; circular economy; industrial park; industrial symbiosis model*

Background and purpose of the paper. *The circular economy (CE) has recently gained significant attention within the discourse on sustainable development, capturing the interest of both international institutions and the academic community.*

At the macro level, the literature has emphasized the strategic importance of complex interactions among networks of stakeholders, each with distinct identities, which collectively contribute to the co-creation of ecosystem shared value (Pera et al., 2016; Bailey et al., 2019). These collaborative dynamics drive innovative solutions aimed at mitigating environmental degradation and fostering circular restorative systems in localized contexts (Suchek et al., 2021; Triguero et al., 2023).

Within this framework, scholars argue that one of the most practical applications of CE is industrial symbiosis (IS) (e.g., Guo et al., 2016). As sub-field of industrial ecology (IE), IS involves "traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and/or by-products" (Chertow, 2000, p. 313). It is widely regarded as a cornerstone strategy for advancing the transition towards CE, particularly at the local level (European Commission, 2015; Baldassarre et al., 2019; Domenech et al., 2019; Lüdeke-Freund et al., 2019).

Notably, the concepts of CE and IS are closely interconnected. Indeed, the theoretical evolution of CE itself originates from the principles of IE, which have redefined perspectives on industrial development since their inception in 1989 (Heeres et al., 2004). On the other hand, IS operationalizes the principles of CE by specifically targeting the closure of pre-consumer (i.e., industrial) loops, where the by-products or residues of one entity are repurposed as inputs for another, thereby creating interconnected resource flows (Chertow 2000).

Consistent with the vision above, a growing body of research underscores the opportunities enabled by IS within local systems, particularly through the exchange of materials, energy, water, and by-products. Historically, geographic proximity has been identified as a critical driver of sustainable practices (Del Baldo, 2009; De Chiara, 2016; Moggi et al., 2022). More recently, IS has been recognized for its role in supporting circular practices, while the ecosystem perspective emphasizes the capacity of communities and their cultural frameworks to create systems of actors and infrastructures that foster locale development in terms of territorial growth and resilience (Iacobucci and Perugini, 2021; Bastian and Zucchella, 2022; Wurth et al., 2022).

Furthermore, studies (e.g., Baldassarre et al., 2019) remark that IS finds practical application in the design, implementation, and evaluation of IPs. These parks are defined as physical "communities of manufacturing and service businesses seeking enhanced environmental and economic performance through collaboration in managing environmental and resource issues, including energy, water, and materials" (Ehrenfeld, 2004; Massard et al., 2018). By

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fostering such collaborations, IPs exemplify how IS principles can be operationalized to achieve both environmental sustainability and economic viability.

However, the debate appears to lack a thorough exploration of the enabling factors required to implement an IS model within local systems, particularly in the context of IPs. While the literature has addressed general aspects of IS—such as its evolution, development, and efficiency evaluations (Huang et al., 2019)—there is limited understanding of the specific enablers that support the implementation of symbiotic synergies in the context of IPs (Henriques et al., 2021).

Moreover, most of existing studies often focus on theoretical approaches or isolated case studies (e.g., Maalouf et al., 2020; Kowalski et al., 2023), without offering practical tools or frameworks for implementing IS in IPs. To address this gap, this paper seeks to identify the enabling factors for IS in IPs from the perspective of the CE through a comprehensive literature review, responding to the following research question:

RQ1: What are the enabling factors for implementing an IS model within IPs?

In addressing this research question, the study contributes to the field of IE by developing a conceptual framework that synthesises the identified enabling factors, providing a structured foundation for future empirical research. At the same time, this framework represents an initial step towards the creation of an operational model to facilitate IS adoption in industrial districts. By identifying these enabling factors, the study offers actionable insights for policymakers and industrial park managers, equipping them to overcome regulatory and operational barriers to IS implementation.

Moreover, the study underscores the potential of IS as a catalyst for sustainable development models rooted in CE principles, bridging the gap between academic research and local development policies. Accordingly, understanding the critical factors for developing an IS model within IPs represents a foundational step towards designing territorial development strategies aligned with CE principles.

Methodology. *To identify and understand the key enablers of IS implementation in IPs, we carried out a systematic literature review (SLR). According to Ginsberg and Venkatraman (1985), SLR is regarded as an essential instrument for methodically assessing a particular corpus of literature. Furthermore, SLR is a useful technique for identifying research gaps in the literature as it is thorough, organized, and analytical (Klassen et al., 1998). SLR is widely used in management and entrepreneurship research (Pittaway et al., 2004; Crossan and Apaydin, 2010; Parris and Peachey, 2013) and the broad social sciences (Tranfield et al., 2003). It has several advantages, such as the capacity to create adaptable databases of articles that are simple to update and query (Pickering and Byrne, 2014).*

With reference to databases, we draw on the Web of Science (WOS) and Elsevier Scopus databases, that have been widely adopted in prior academic research (e.g., Atanasovska et al., 2022; Mariani et al., 2023), and are considered the most comprehensive sources of studies in the social sciences (Mongeon and Paul-Hus, 2016).

In accordance with prior investigations (e.g., Arsova et al., 2022), our research process follows several stages (Table 1). First, we identified a query that included keywords referring to the concepts of CE ("circular economy" OR "CE"), IS ("industrial symbiosis" OR "IS"), and IPs. Given the numerous synonyms associated with the term "industrial park" a specific list of keywords was created through a survey conducted with a panel of experts from both academic and professional fields. In particular, to address this aspect, we employed the Delphi method, which also helped strengthen the robustness of our systematic literature review. This method involves gathering insights and achieving consensus from a panel of experts through controlled feedback. As noted by Taylor (2020, p. 12), "the Delphi method is a process for gaining consensus through controlled feedback from a panel—a group made up of experts or individuals knowledgeable on the subject."

The expert panel for this phase included both academic researchers and stakeholders (Cole et al., 2013). Among the stakeholders, we included individuals from institutional and professional backgrounds. The selection of the expert panel, a critical aspect of the Delphi method (Gordon, 1994), began with the creation of a list of potential participants. For academic experts, we conducted a literature search to identify researchers who have frequently published on topics such as CE, IS, and IPs. This initial list of 18 participants was then expanded to include representatives (9 participants) from various research centres linked to policy institutions (e.g., European Commission, ENEA, UNEP) and professional associations (4 participants). This process resulted in a final panel of 31 participants. The size of the expert panel aligns with prior studies (e.g., Oxley et al., 2024).

To ensure diversity and inclusivity, we followed the approach of several scholars (e.g., Busch and Rajwade, 2024), making a conscious effort to include participants with diverse genders, professional titles, and geographic locations. Such diversity was essential to gather a wide range of viewpoints and foster consensus among a varied group of participants. This approach is supported by prior studies, which have found that expert panels of approximately 31 members are sufficient to generate meaningful insights, as larger groups tend to produce limited additional ideas while reducing the depth of exploration (Delbeq et al., 1975). The success of this process relies on the inclusion of the right kinds of experts—individuals who understand the issues, possess relevant vision, and represent a variety of perspectives.

Following previous investigations (e.g., Ruiz-Pérez et al., 2021), the survey administered to the expert panel comprised three sections. The first section provided an overview of the project, outlining its objectives and significance. The second section presented a comprehensive list of keywords related to the concept of IPs, particularly those frequently used in studies focused on CE. In the third section, respondents were invited to share their opinions and suggestions on the selection of these keywords, ensuring alignment with the study's aims.

This structured approach allowed us to guide the experts' attention to one aspect at a time. To facilitate their participation, we allocated a 15-day response period, including a reminder sent one week after the initial invitation. In this round, the response rate was 26%, consistent with prior studies employing the same technique (e.g., Boor et al., 2011). This procedure led to the selection of the following keywords referring to the IPs' concept: ("industrial park"); ("industrial cluster*"); ("industrial district*"); ("eco-industrial park*" OR "eco-park*").*

Secondly, we ran the query to both databases, focusing on works published up to December 2024. To refine the results of our search, we applied specific inclusion criteria. First, we focused on specific types of documents, including articles, review articles, conference papers, and book chapters, as in recent studies adopting the same empirical approach (e.g., Mariani et al., 2023). Additionally, we limited the search to works published in English.

The initial search across the two databases yielded 250 studies from WOS and 315 studies from Scopus. After applying our screening criteria—filtering by document type and language—we further refined the results by removing duplicates within each database. Regarding the research areas, we focused on Environmental Science Ecology, Business Economics, and Social Science and Other Topics for WOS, while for Scopus, we considered Environmental Science, Business, Management and Accounting, Economics, Econometrics and Finance, and Social Sciences. This selection is justified by the widely recognised multidisciplinary nature of issues related to the CE and IS. Recent studies (e.g., Arsova et al., 2022; Koval et al., 2022; Okeke, 2024) highlight how these topics span multiple disciplines, including environmental science, economics, business management, engineering, social sciences, and urban planning. Following this process, the number of records was reduced to 241 contributions from WOS and 198 from Scopus.

Thirdly, the datasets were then merged, and duplicates were removed to ensure the uniqueness of the records, resulting in a final total of 192 contributions.

In the last step, we conducted a manual screening of the abstracts to evaluate the relevance of each study to our research objective. This analysis allowed us to exclude 26 records that did not align with the aim of the study. As a result, the final dataset consisted of 166 records, representing a curated collection of studies directly relevant to our investigation.

Table 1. Systematic literature review process.

Step I: Identification	***Query*** ("circular economy" OR "CE") AND ("industrial symbiosis" OR "IS") AND ("industrial park*" OR "industrial district*" OR "industrial cluster*" OR "eco-industrial park*" OR "eco-park*")			
Step II: Screening	***Document type*** Article, review article, conference paper, book chapter ***Language*** English			
	Research areas (WOS)	***Output***	***Research areas (Scopus)***	***Output***
	Environmental Science Ecology	201	Environmental science	158
	Business Economics	44	Business, Management and Accounting; Economics, Econometrics and Finance	102
	Social Science and Other Topics	5	Social sciences	55
	Tot.	250	Tot.	315
	Tot. (without duplicates)	**241**	Tot. (without duplicates)	**198**
Step III: Merging of the samples (WOS + Scopus)	***Total number of records (without duplicates): 192***			
Step IV: Manual screening based on abstract	Excluded	**26**		
	Total number of records: 166			

Results. *Although still in its preliminary stage, the findings reveal significant enablers of IS within IPs, which can be categorized into internal and external factors, as illustrated in Table 2. Internal factors include key elements such as entrepreneurs' characteristics and organizational capabilities, while external factors encompass broader influences like economic conditions and the government intervention.*

1) Entrepreneur's characteristics

The literature highlights that the attributes of entrepreneurs are crucial for promoting IS initiatives in IPs. Cervo et al. (2019) emphasize the essential significance of a dedication to sustainable development and the incorporation of IS principles into business operations. Entrepreneurs must be driven to disseminate resources and information while exhibiting reliability concerning the sustainability potential of their ventures (Mulrow et al., 2017). Moreover, cultivating a culture of trust and collaboration is crucial for enabling the efficient exchange of resources and materials (Kowalski et al., 2023). Entrepreneurial competencies, especially the capacity to interact with regulatory bodies and overcome social

obstacles, are crucial in influencing the success of IS initiatives (Ceglia et al., 2017). The present availability of organized information about business requirements and the readiness to share such information are critical elements that can facilitate or obstruct the formation of industrial networks (Giannoccaro et al., 2023). Finally, a supportive cultural environment marked by receptiveness to change and collaboration is essential for facilitating the adoption of industrial symbiosis practices (Yang et al., 2022).

2) Organizational capabilities

In the realm of organizational capabilities, Kuznetsova et al. (2016) assert that the advancement of eco-industrial parks is significantly dependent on firms' capacity to create intelligent networks for resource exchange. Efficient communication and cooperation among companies are crucial for optimizing resource distribution and improving sustainability results (Fraccascia et al., 2021). The capacity for innovation within organizations significantly impacts the success of information systems initiatives, as firms must adapt and implement new technologies and processes to facilitate efficient resource sharing (Boom-Cárcamo & Peñabaena-Niebles, 2022). The existence of proficient individuals capable of handling intricate regulatory structures and cultivating collaborations is essential (Neves et al., 2019). Moreover, an organisational culture that emphasizes sustainability and promotes proactive stakeholder engagement can augment the efficacy of IS practices (Daddi et al., 2017).

3) Government intervention

The debate has also emphasised the significant role of government intervention, which we refer to as the "institutional factor". Many scholars consider government support a crucial element that facilitates interaction among various actors in the creation of an industrial symbiosis model and its long-term sustainability.

In the literature, several key interventions are identified as essential for fostering this model. These include the establishment of favourable regulations, such as environmental policies (Belaud et al., 2019) and frameworks that promote the CE (Henriques et al., 2021). Additionally, the harmonization and coordination of policies, along with the introduction of financial incentives (Maalouf et al., 2020), play a significant role. The definition of the role of intermediaries (Henriques et al., 2021) and the establishment of collaborative governance structures (Schlüter et al., 2023) are also crucial, as they are built on a shared understanding of the functions of symbiotic networks. Furthermore, the creation of institutional coordination networks is deemed essential for promoting inter-company IS activities (Wang et al., 2017).

4) Economic conditions

The discussion also delves into several issues related to the economic factor, highlighting the needs and opportunities within the economic sphere. Studies underscore the benefits of cost reduction (Mulrow et al., 2017; Henriques et al., 2021; Giannoccaro et al., 2023), illustrating how pursuing efficiency strategies can positively impact profitability (Giannoccaro et al., 2023). Moreover, there are new business opportunities arising from the potential to leverage public and private funding for innovative projects (Henriques et al., 2021), as well as the possibility of obtaining financial (Maalouf et al., 2020) and fiscal incentives (Mulrow et al., 2017). In the design phase of industrial symbiosis models within IPs, assessing economic feasibility is critical (Cervo et al., 2019).

Table 2. Conceptual model of enabling factors of IS within Ips

Internal enabling factors of IS within IPs	
Entrepreneurs' traits	**Source**
Commitment to sustainability	Cervo et al. (2019)
Availability to share resources and information	Mulrow et al. (2017); Giannocchiaro et al. (2023)
Trusting and cooperative attitude	Kowalsi et al. (2023)
Ability to manage relations with regulatory bodies	Ceglia et al. (2017)
Openness to change	Yang et al. (2022)
Organizational capabilities	**Source**
Intelligent network creation	Kuznetsova et al. (2016)
Effective communication and cooperation	Fraccascia et al. (2021)
Innovation capacity	Boom-Cárcamo and Peñabaena-Niebles (2022)
Regulatory complexity navigation	Neves et al. (2019)
Sustainability-oriented culture	Daddi et al. (2017)
External enabling factors of IS within IPs	
Government intervention	**Source**
Favorable regulations	Belaud et al. (2019); Henriques et al. (2021)
Financial and fiscal incentives	Maalouf et al. (2020)
Role of intermediaries	Henriques et al. (2021)
Collaborative governance	Schlüter et al. (2023)
Institutional coordination networks	Wang et al. (2017)
Economic conditions	**Source**
Cost reduction	Mulrow et al. (2017); Henriques et al. (2021); Giannoccaro et al. (2023).
New business opportunities	Henriques et al. (2021)
Financial and fiscal incentives	Mulrow et al. (2017); Maalouf et al. (2022)
Economic feasability	Cervo et al. (2019)

Source: Authors' elaboration

Research limitations. *This study has certain limitations that future research could address. Firstly, our analysis relies on the organization of existing literature. We suggest that researchers utilize more advanced data science techniques, including text-mining and machine learning tools like topic modeling, to identify the underlying semantic structures within the documents reviewed. Secondly, alternative sources such as Google Scholar could have been utilized to obtain additional scientific outputs that are not indexed in Scopus or the WOS. Finally, since this study is preliminary in nature, its findings will be validated through semi-structured interviews with entrepreneurs operating within an industrial park selected in the context of this research project financed by PNRR funds.*

Practical implications. *This study highlights practical implications for both managers and policy-makers. On the managerial side, firms of industrial district need to develop a greater propensity for IS by leveraging on a willingness to participate in collaborative initiatives, strengthening their capabilities through specific skills and resources, and identifying new business opportunities arising from shared resources, among the others.*

On the policy front, it is crucial to define coordination strategies and guidelines to foster the adoption of IS, accompanied by awareness-raising and training programs to raise awareness among companies. Furthermore, financial incentives can support the necessary investments, while the use of digital tools can facilitate the management and monitoring of IS initiatives, making the model more effective and replicable.

Originality of the paper. *This work offers novel insights into the fields of IE and CE by focusing on IPs. Specifically, we identify and illuminate the critical factors that facilitate the promotion of IS within these settings. The key factors identified are organized into four main categories: entrepreneurial traits, potentially drive collaboration, resource sharing, and innovation within IS initiatives. Organizational capabilities, referring to internal competencies enabling firms to engage in and sustain symbiotic relationships. Institutional context, which creates an enabling environment for IS to thrive. Economic conditions, which shape firms' willingness and ability to participate in IS.*

By identifying and structuring these factors, this work provides a guiding framework for leveraging IS opportunities within industrial districts and a practical model to assess the effectiveness of IS initiatives in IPs. Complementing the existing literature on IS, we offer actionable recommendations for practitioners to foster collaboration, facilitate resource sharing, and promote the sustainable development of local systems.

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Exploring the complexity of choosing a smartphone: How do perceived sustainability tensions and paradoxical mindset influence greener consumer choices?

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Abstract

Refurbishing and reusing mobile devices is a key strategy to reduce the environmental impact of the smartphone sector and boost circularity. Understanding and increasing consumer proneness to buy second-hand and refurbished phones is crucial for a green and circular transition. Some studies have explored consumer attitudes and intentions towards refurbished phones. Given the complexity of consumer choices, our study aims to explore the role of perceived trade-offs/tensions between smartphone attributes (e.g., price, technical performance, aesthetics), and environmental sustainability, and how this perception influences greener purchasing decisions. We also investigate the role of environmental concern about electronic sector, perceived green value and perceived risks of used/refurbished phones. We highlight the role of a paradoxical mindset as moderator between consumers' perceptions and greener choices. Data were collected through a questionnaire administered in February 2024 to a representative sample of 2010 Italian respondents aged 18-70. We used structural equation modeling to analyze data.

Framing the research. *The consumer electronics sector, particularly the smartphone industry, is one of the most critical areas in terms of environmental impact due to high resource consumption, CO_2 emissions, and electronic waste generation (EEA, 2020). In this context, the market for refurbished and second-hand smartphones emerges as a strategic solution to extend device lifespan and mitigate the negative effects of new device production. The transition to a more sustainable consumption model, however, is a complex process that requires a transformation in consumer habits. An increasing number of studies focus on consumers' propensity to purchase more sustainable products, emphasizing the role of environmental attitudes and beliefs, perceived green value of products, and price sensitivity (Syed et al.,2024; Testa et al., 2021; Paul et al., 2016; Wang & Hazen, 2016;.Chen & Chang, 2012; Michaud & Llerena, 2011). However, despite the evident environmental and economic benefits of refurbished devices, numerous studies have highlighted persistent psychological barriers and negative perceptions that hinder their widespread adoption (Bigliardi et al., 2022; Mounesan, 2023). These obstacles include perceived risks related to product quality and reliability, a lack of trust in refurbishment processes, and unfavorable comparisons with new devices in terms of performance and aesthetics (Nasiri & Shokouhyar, 2021). Indeed, purchasing behavior in the smartphone market presents complexities. Consumers can face tensions between their desire for environmentally sustainable products and other attributes such as price, technical performance, aesthetics, and more (Luchs & Kumar, 2017). Paradox Theory could offer a useful interpretive framework for understanding how individuals approach these trade-offs and how their ability to accept and manage contradictions influences purchasing decisions (Smith & Lewis, 2022). However, the role of a paradox mindset in consumer decision-making remains a scarcely explored aspect in existing literature.(Testa et al, 2025). Paradox Theory suggests that individuals constantly face tensions between conflicting values and objectives, and their ability to navigate these contradictions significantly influences their choices (Miron-Spektor et al., 2018; Smith & Lewis, 2022). In the case of second-hand and refurbished smartphones, consumers must balance the desire for a technically advanced and aesthetically appealing device with the need to save money, concerns about durability, the intent to reduce environmental impact, and other competing factors..*

Purpose of the paper. *Our research aims to analyze the effect of several factors on the purchasing behaviour of used/refurbished smartphone including the environmental concern about the electronics sector (ECES), the awareness of green value (AGV), the perceived risks (PR) and the perceived trade-offs between smartphone attributes and*

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environmental sustainability (perceived tensions with environmental sustainability - TES). Moreover, we aim to explore the potential moderating role of a paradoxical mindset (PM) in the relationship between perceived tensions, perceived risk, green value, and purchase behavior. We make an innovative contribution to the literature on greener consumption by introducing Paradox Theory.(Smith & Lewis, 2011) as an interpretative framework for analyzing purchasing behavior in the used/refurbished smartphone market. Our findings provide practical insights for policymakers and businesses professionals to encourage broader adoption of second-hand and refurbished products.

Building on previous research (Agostini et al., 2021; Hamzaoui-Essoussi & Linton, 2014; Harms & Linton, 2016; Liu & Tsaur, 2020; Testa et al., 2025) and drawing from behavioral theories (Ajzen, 1991; Festinger, 1957; Stern, 2000) as well as Paradox Theory (Smith & Lewis, 2011), we developed and tested the following hypotheses in our study:

H1: Environmental Concern about Electronic Sector (ECES) positively influences the Awareness of Green Value (AGV) of refurbished and second-hand smartphones

H2: The Awareness of Green Value (AGV) positively influences the Purchasing Behaviour of refurbished and second-hand smartphones (PB)

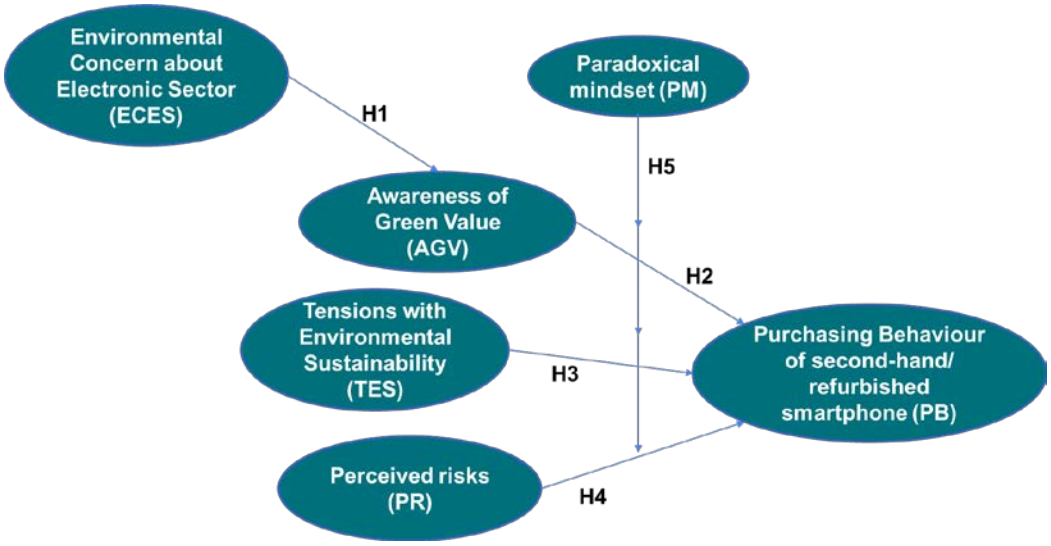
H3: Perceived risks (PR) negatively influence the Purchasing Behaviour of refurbished and second-hand smartphones (PB)

H4: Perceived Tensions with Environmental Sustainability (TES) positively influence the Purchasing Behaviour of refurbished and second-hand smartphones (PB)

H5: Paradox mindset (PM) moderates the relation between (a) Tensions with Environmental Sustainability/ (b) Perceived Risks/ (c) Perceived Green Value and the Purchasing Behaviour of refurbished and second-hand smartphones (PB)

Figure 1 describes our proposed model and the hypothesized relations.

Fig. 1: The proposed model



Methodology

Sample and data collection

Our study relies on data collected through a questionnaire-based survey conducted during February 2024 on a large and representative sample of the Italian population (n=2010) aged 18-70. We analysed data using structural equation modelling (SEM) and multi-group SEM.

The questionnaire was administered online through a professional survey service provider that guaranteed sample representativeness in terms of gender, age, and geographical distribution. The provider guaranteed that the mean responses of the sample represent the reference population with a confidence interval of ± 3.1%.

Our questionnaire took approximately 20 minutes to be completed and remained "in the field" for about 10 days. Only complete questionnaires, where the participants answered all the questions, were considered valid.

The demographic characteristics of the final sample and the reference population (Italians) are shown in Table 1. All the parameters of representativeness of the sample set a priori were satisfied.

Tab. 1: Sample demographics and reference population

Demographics	Values	Sample n=2010		Population 18-70 (year 2023)	
		Absolute frequencies	%	Absolute frequencies	%
Gender	Male	985	49,00%	19.982.317	49,90%
	Female	1025	51,00%	20.051.811	50,10%
Age	Generation Z (18-26)	259	12,89%	5.346.832	13,40%
	Millennials (27-42)	501	24,93%	10.561.927	26,40%
	Generation X (43-55)	576	28,66%	11.624.945	29,00%
	Baby boomers (56-70)	674	33,53%	12.500.424	31,20%
Geographical origin	North-west	531	26,43%	10.716.471	26,77%
	North-east	409	20,36%	7.824.154	19,54%
	Center	406	20,21%	7.935.642	19,82%
	South + islands	663	33,00%	13.557.861	33,87%
Education	Graduate and post-graduate	565	28,11%	8.272.490	19,10%
	High school	1270	63,18%	18.989.628	43,90%
	Middle school	172	8,56%	12.213.216	28,20%
	Elementary school or no-title	3	0,15%	3.187.770	7,40%
	Not available			625.473	1,40%
Wealth perception (“My family income allows me to live…”)	Comfortably	78	3,88%		
	Peacefully	898	44,68%		
	I feel difficulties	753	37,46%		
	I arrive at the end of the month with many difficulties	198	9,85%		
	I feel poor and I can’t make it to the end of the month	83	4,13%		

Measurement

To measure our constructs of interest we took inspiration from validated scales in literature. When necessary, we adapted, revised, or created our own items to suit the purpose and context of the study.

Each construct scored a satisfying Cronbach’s alpha (> 0.7). All details are reported in Table 2.

Tab. 2: Measures

Latent constructs	Items	Response scale	Source	Alpha
Environmental concern about electronic sector (ECES)	The consumer electronics sector (e.g. smartphones) generates very serious impacts on the environment	7 points Likert scale from 1=Totally disagree to 7=Totally agree	Adapted to the electronic sector from Trivedi et al., 2018	0.833
	Changing the choice of a smartphone towards more sustainable options should be a priority			
	It is extremely important to reduce the environmental impact of electronic products (e.g. smartphones)			
Perceived Tensions with sustainability (TES)	Cheap smartphones are often made in a way that makes them less sustainable for the environment and society, and vice versa	7 points Likert scale from 1=Totally disagree to 7=Totally agree	Authors’ elaboration	0.793
	New smartphones that perform better technically are less sustainable for the environment and society, and vice versa			
	The most fashionable smartphones are less sustainable for the environment and society, and vice versa			
Paradoxical mindset (PM)	When you feel conflicts/incompatibilities between two features in choosing a smartphone, you feel… … able to grasp and manage all aspects related to the choice	7 points Likert scale from 1=Totally disagree to 7=Totally agree	Adapted to the consumer context from Miron-Spektor et al., 2018	0.889
	… comfortable in looking for a solution that includes both			
	… more aware of the action I am about to take			
	… excited about having to reconcile contrasting aspects			
	… amused when I manage to pursue both			
	… excited every time such contradictory questions arise in front of me			
Awareness of green value (AGV)	A used/refurbished smartphone has environmental benefits that add value to the product	7 points Likert scale from 1=Totally disagree to 7=Totally agree	Adapted from Bigliardi et al., 2022	0.897
	Buying a used/refurbished smartphone helps satisfy the need to have less impact on the environment			
	For me, buying a used/refurbished smartphone - instead of a new one - is preferable because it is less harmful to the environment			
Perceived risks (PR)	Buying a used/refurbished smartphone is risky because the technical performance (e.g. battery life) is not certain	7 points Likert scale from 1=Totally disagree to 7=Totally agree	Authors’ elaboration inspired by Nasiri & Shokouhyar, 2021	0.868
	There is a risk that a used/refurbished smartphone may have scratches or unattractive aesthetic defects			
	There is a risk that the performance of a refurbished phone may not be as desired			
Purchasing behaviour (PB)	When I needed to buy a smartphone, I chose a used one	5 points frequency scale from 1=never to 5= always/ all the times	Authors’ elaboration	0.835
	When I needed to buy a smartphone, I chose a refurbished one (i.e. a used smartphone subjected to a verification, repair and cleaning process by a specialized company)			

Results. *We performed Harman's single factor test to control whether a single factor accounted for the majority of variance (Podsakoff & Organ, 1986), finding no evidence of serious common method bias (Fuller et al., 2016).*

We used SEM and multi-group structural equation modelling to analyze data.

Validation of the measurement model

The convergent and discriminant validity of our constructs meet Fornell and Larcker's (1981) criteria. Specifically, the Average Variance Extracted (AVE) for each latent construct exceeds the threshold of 0.5, confirming convergent validity, indicating that the constructs adequately explain their variance. Furthermore, since the AVE values are greater than the squared correlations (SC), there is no issue with discriminant validity, meaning that the constructs are distinct. The fulfilment of both discriminant and convergent validity criteria suggests strong measurement quality, reinforcing the reliability of our model. See Table 3.

Tab. 3: Measures validity assessment

Convergent and Discriminant Validity Assessment

Squared correlations (SC) among latent variables

	ECES	AGV	PR	TES	PB	PM
ECES	1.000					
AGV	0.271	1.000				
PR	0.000	0.002	1.000			
TES	0.085	0.047	0.005	1.000		
PB	0.000	0.031	0.013	0.063	1.000	
PM	0.061	0.026	0.011	0.079	0.032	1.000

Average variance extracted (AVE) by latent variables

AVE_ECES	0.629	No problem with discriminant validity No problem with convergent validity
AVE_AGV	0.746	No problem with discriminant validity No problem with convergent validity
AVE_PR	0.691	No problem with discriminant validity No problem with convergent validity
AVE_TES	0.572	No problem with discriminant validity No problem with convergent validity
AVE_PB	0.739	No problem with discriminant validity No problem with convergent validity
AVE_PM	0.573	No problem with discriminant validity No problem with convergent validity

Note: when AVE values >= SC values there is no problem with discriminant validity
when AVE values >= 0.5 there is no problem with convergent validity

SEM results

As suggested by Kline (2016) and Bagozzi and Yi (2012), to evaluate the model fit, we considered the Chi-square test ($\chi 2=397$; degrees of freedom=70), the Root mean square error of approximation (RMSEA=0.048), the comparative fit index (CFI=0.976), the Tucker-Lewis index (TLI=0.968), and the standardized root mean square residual (SRMR=0.043). Based on these indicators of fit, falling within the suggested thresholds, our model gives a good representation of the data (Bagozzi & Yi, 2012).

Looking at the structural relations among variables (see Table 4), we found that: Environmental Concern about the Electronic Sector (ECES) has a strong positive effect on Awareness of Green Value (AGV) (coefficient: 0.523; $p < 0.001$). This means that individuals who are more concerned about the environmental impact of the electronics industry tend to be more aware of the environmental benefit/value associated with second-hand and refurbished smartphones. The relatively high coefficient (0.523) suggests that environmental concerns regarding the electronic sector significantly shape the perception of product green benefits. Hence H1 was supported.

Awareness of Green Values (AGV) has a small but still significant effect (coefficient: 0.116; $p < 0.001$) on Purchasing Behavior of Used/Refurbished Smartphones (PB), supporting H2. The effect size is relatively low, suggesting that green awareness alone may not be enough to drive purchasing behavior.

Perceived Risks (PR) negatively impact the Purchasing Behavior of Used/Refurbished Smartphones (PB) (coefficient: -0.126; $p < 0.001$) suggesting higher perceived risks (e.g., concerns about product performance, battery duration, and aesthetics) discourage consumers from buying used/refurbished smartphones and supporting H3. Since this effect is

statistically significant, companies should focus on reducing perceived risks (e.g., offering warranties, certifications, or transparent refurbishing processes).

Experiencing Tensions with Environmental Sustainability (TES) while choosing a smartphone, positively influences the Purchasing Behavior of Used/Refurbished Smartphones (PB) (coefficient: 0.233; $p < 0.001$) supporting H4. The positive coefficient indicates that individuals who feel strong tensions with sustainability are more likely to choose refurbished smartphones as a solution. This supports the Cognitive Dissonance Theory, suggesting that when consumers recognize a conflict between their consumption habits and sustainability concerns, they may change their behavior to reduce the dissonance.

Tab. 4: SEM results

Standardized	Coefficient	OIM std. err.	z	P>|z|	[95% conf.	interval]
Structural						
AGV						
ECES	.523041	.0196276	26.65	0.000	.4845715	.5615104
PB						
AGV	.1158579	.024379	4.75	0.000	.0680761	.1636398
PR	-.1259776	.023981	-5.25	0.000	-.1729795	-.0789757
TES	.2326609	.0275543	8.44	0.000	.1786556	.2866662

Multigroup SEM results

To test the moderation effect of the paradoxical mindset (H5), a Multigroup Structural Equation Modeling was employed (Jöreskog, 1971; Sorböm, 1974). Multigroup models test a model in two or more discrete groups to investigate differences. This method allows us to examine whether the model structural relationships differ across groups based on the hypothesized moderating variable (paradoxical mindset).

To analyze the moderation effect of the paradoxical mindset using Multigroup SEM, we identified two sub-groups based on individuals' paradoxical mindset scores. A group with a lower Paradoxical Mindset was made up of individuals with PM scores below (Mean - SD); a group with a higher Paradoxical Mindset was made up of individuals with PM scores above (Mean + SD). We preliminary checked the measurement validity in both the two groups finding no differences/issues in terms of convergent and discriminant validity.

Then we analysed differences in structural paths (see Table 5 and Table 6) finding that:

In the High PM group, awareness of green value (AGV) significantly increases the likelihood of purchasing used/refurbished smartphones (PB). In the Low PM group, AGV has no effect on actual behaviour. This suggests that paradoxical thinkers are better at translating the awareness of refurbished smartphones' green value into real purchasing decisions, while low paradoxical thinkers may recognize products' green benefits but fail to act upon them. In practice, this means that just increasing sustainability awareness is not enough to drive green consumption in individuals with a low paradoxical mindset.

In the High PM group, perceived risks (PR) actually have a positive influence on purchasing behaviour. In the Low PM group, perceived risks strongly discourage purchasing behaviour (-0.402).

This means that high paradoxical thinkers are less affected by potential risks and may even see them as challenges to overcome. Low paradoxical thinkers, however, are highly risk-averse and avoid buying refurbished smartphones due to concerns about reliability, performance and aesthetic features. For companies targeting low paradoxical consumers, reducing perceived risks (e.g., offering warranties, transparent refurbishing processes, brand trust) is essential.

For high paradoxical thinkers, perceiving sustainability tensions significantly increases their likelihood of purchasing refurbished smartphones. For low paradoxical thinkers, perceived sustainability tensions have no significant impact on their behaviour. This suggests that high paradoxical thinkers actively engage with and resolve sustainability dilemmas, leading them to choose refurbished products as a way to mitigate sustainability conflicts. Low paradoxical thinkers, on the other hand, may struggle with these contradictions and experience decision paralysis, preventing them from making sustainable purchasing choices.

Concluding, our results show that the paradoxical mindset significantly moderates consumer decision-making intervening in the relations between AGV, PR, TES and Purchasing Behaviour of refurbished and second-hand smartphones (PB). Hence H5 is supported.

We can say that high paradoxical thinkers are more flexible and adaptive. They act considering the perceived product green value and the tensions with sustainability and are not deterred by perceived risks. They view sustainability tensions as motivators rather than obstacles. Instead, low paradoxical thinkers are more rigid and risk-averse. They may be aware of green value but do not translate this awareness into action. They strongly avoid risks and struggle with sustainability tensions, leading to inaction.

Our results confirm that the paradoxical mindset is a key consumer psychological factor. Businesses and policymakers should tailor their strategies accordingly to effectively promote refurbished smartphone purchases among different consumer segments.

Table 7 provides a summary of hypotheses and results.

Tab. 5: Multigroup SEM results (High Paradoxical Mindset group)

Standardized	Coefficient	OIM std. err.	z	P>|z|	[95% conf. interval]	
Structural						
AGV						
ECES	.3865976	.0595372	6.49	0.000	.2699069	.5032883
PB						
AGV	.2353698	.0605475	3.89	0.000	.1166989	.3540407
PR	.1498016	.0617142	2.43	0.015	.028844	.2707593
TES	.3292103	.0595364	5.53	0.000	.2125212	.4458994

Tab. 6: Multigroup SEM results (Low Paradoxical Mindset group)

Standardized	Coefficient	OIM std. err.	z	P>|z|	[95% conf. interval]	
Structural						
AGV						
ECES	.5456992	.0490823	11.12	0.000	.4494996	.6418988
PB						
AGV	.0064087	.0705453	0.09	0.928	-.1318575	.144675
PR	-.4024711	.0642643	-6.26	0.000	-.5284268	-.2765153
TES	.1283544	.0732134	1.75	0.080	-.0151412	.2718499

Tab. 7: Summary of hypotheses and results

Hypotheses	Results
H1: Environmental Concern about Electronic Sector (ECES) positively influences the Awareness of Green Value (AGV) of refurbished and second-hand smartphones	Supported
H2: The Awareness of Green Value (AGV) positively influences the Purchasing Behaviour of refurbished and second-hand smartphones (PB)	Supported
H3: Perceived risks (PR) negatively influence the Purchasing Behaviour of refurbished and second-hand smartphones (PB)	Supported
H4: Perceived Tensions with Environmental Sustainability (TES) positively influence the Purchasing Behaviour of refurbished and second-hand smartphones (PB)	Supported
H5: Paradox mindset (PM) moderates the relation between (a) Tensions with Environmental Sustainability/ (b) Perceived Risks/ (c) Perceived Green Value and the Purchasing Behaviour of refurbished and second-hand smartphones (PB)	Supported

Research limitations. *Despite our efforts to minimize bias in questionnaire design, this study may still be subject to the typical limitations associated with cross-sectional design and self-reported measures (Podsakoff & Organ, 1986). These limitations include the inability to establish causal relationships and the potential for response biases, such as social desirability or recall errors. Additionally, while the sample is representative of the Italian population, the findings may not be fully generalizable to other cultural contexts. To address these limitations, future research could adopt longitudinal approaches that track real consumption choices over time, providing a more dynamic and comprehensive understanding of how targeted interventions and educational initiatives might foster paradoxical thinking, helping consumers navigate the inherent trade-offs between sustainability, affordability, and other product attributes.*

Managerial implications. *From a practical standpoint, businesses and policymakers should focus on reducing perceived risks through transparent refurbishment processes, extended warranties, and quality certifications. At the same time, they should enhance both the economic and environmental benefits of remanufactured devices through marketing strategies and awareness campaigns. They can develop tools to leverage consumers' paradoxical thinking, helping them embrace conflicting aspects that arise when choosing a smartphone and encouraging greener solutions such as opting for remanufactured/used smartphones. Policymakers can support more sustainable consumption by promoting the purchase of refurbished devices through awareness campaigns and tax benefits (EEA, 2020). Tailoring communication strategies to different consumer mindsets can optimize the impact of pro-environmental messaging.*

Originality of the paper. *This study contributes to a deeper understanding of consumer behaviour regarding refurbished and second-hand products, with a particular focus on smartphones. Indeed, despite the recognized*

environmental benefits of choosing a used device over a new one, this behaviuor still encounters contradictions and barriers (Bigliardi et al., 2022; Mounesan, 2023).

Moreover, our study flows well with embryonic research leveraging Paradox Theory into the field of sustainable consumption, offering a novel perspective on consumer decision-making in the refurbished smartphone market (Smith & Lewis, 2011; Testa et al., 2025). By examining the moderating role of PM, the research provides insights into how cognitive flexibility influences greener purchasing behavior.

Grounded in behavioural theories such as the Theory of Planned Behavior (TPB) (Ajzen, 1991), our paper confirms the significant role of environmental awareness in shaping consumer preferences. In particular, awareness of the environmental impact of the electronics sector - termed Environmental Concern about the Electronics Sector (ECEC) - strongly influences the awareness of green value (AGV) of second-hand and remanufactured electronic products. However, while awareness of products' environmental benefits has a positive effect on refurbished smartphone purchases, this effect remains weak, suggesting that awareness alone is not enough to drive action. As also previous studies have suggested, perceived risks (PR) emerge as a barrier to purchasing refurbished smartphones, highlighting the need for companies to build consumer trust (Mugge et al., 2017; Agostini et al., 2021). These findings tell us that while sustainability concerns and product' awareness can promote the adoption of used/refurbished smartphones, perceived risks remain a key challenge that must be addressed through marketing strategies, product assurances, and consumer education.(Sharifi &.Shokouhyar, 2021). Consumers often struggle to balance environmental benefits against concerns related to product reliability, performance, and aesthetics. This reinforces previous research indicating that green consumption choices are complex and involve trade-offs between sustainability and other product attributes (Testa et al., 2022; Olson, 2022; Swait & Adamowicz, 2001).

An interesting insight of our study is that the perception of tensions between products' characteristics (performance, price, etc.) and environmental sustainability can act as a driver of behavioural change. This can be interpreted under the light of the Cognitive Dissonance Theory (Festinger, 1957) where consumers tend to align their attitudes and behaviour when they feel a psychological discomfort. We found that higher perceived tensions with sustainability encourage used/refurbished smartphone purchases, supporting the idea that recognition of trade-offs between products' favored features and environmental aspects can drive a pro-environmental change.

In our study, the paradox mindset emerges as a significant moderating factor in consumer decision-making suggesting that Paradox Theory can provide a useful interpretive framework for understanding how individuals approach trade-offs and how their ability to accept and manage contradictions influences purchasing decisions (Smith & Lewis, 2022; Miron-Spektor et al., 2018). Consumers with a high paradox mindset are better equipped to reconcile conflicting product attributes, making them more likely to opt for used/refurbished devices. This suggests that promoting cognitive flexibility and emphasizing the compatibility of sustainability with performance and affordability could enhance consumer adoption of refurbished products.

Key words: *Consumer behavior, paradoxical mindset, refurbished smartphones, second-hand smartphones, perceived tensions, sustainability trade-offs.*

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The impact of sustainability in work psychology and corporate training

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Abstract

The article explores the impact of sustainability in work psychology and corporate training. Using a blended approach, the research analyzes how sustainable practices affect employees' psychological well-being and the effectiveness of corporate training programs. The results show that sustainability can improve the quality of working life, increase motivation and reduce stress. The managerial implications suggest the adoption of company policies that promote sustainability to achieve long-term competitive advantages. Sustainability has become a central theme in business and academic discussions, influencing various areas, including work psychology and corporate training. This study aims to explore the intersection between these domains, using a theoretical framework that integrates self-determination theory and stakeholder theory. The research methodology combines qualitative and quantitative methods, including in-depth interviews, surveys, and case study analyses, to gain a comprehensive understanding of the phenomenon being studied. Preliminary results indicate that sustainable practices can significantly improve employees' psychological well-being, reducing stress and increasing job satisfaction. In addition, corporate training programs that integrate sustainability principles are effective in promoting sustainable skills and improving job performance. The managerial implications suggest that companies should adopt flexible work policies, psychological support programs and initiatives to promote work-life balance. The originality of the article lies in its ability to integrate two fundamental theories for understanding motivation and organizational behavior, offering an innovative theoretical framework for understanding how sustainable practices can influence employee well-being and business performance. In addition, the article stands out for its innovative methodology and focus on the practical implications of the results, offering concrete recommendations for companies on how to integrate sustainable practices into work psychology and corporate training. Companies that adopt these practices can improve employee well-being, increase motivation and engagement, reduce turnover and absenteeism, improve business performance, strengthen their reputation, and contribute to the Sustainable Development Goals. These benefits can lead to long-term success and increased competitiveness in the global marketplace, but also contribute to a more sustainable and prosperous future.

Research framework. *Sustainability has become a central theme in business and academic discussions, influencing various areas, including work psychology and corporate training. This article explores the impact of sustainability in these areas, proposing a work-in-progress research project that clearly identifies the conceptual development, objectives and methodological frameworks. The research project is based on a theoretical framework that integrates the theory of self-determination and the theory of stakeholders. The theory of self-determination, developed by Deci and Ryan, suggests that individuals are inherently motivated when they experience autonomy, competence, and relationality. Stakeholder theory, on the other hand, emphasizes the importance of considering the interests of all stakeholders in the implementation of sustainable practices.*

Sustainability in work psychology is not only limited to mental health, but also includes the promotion of a safe and healthy work environment. Companies can implement measures to reduce physical risks and improve workplace safety, thereby contributing to the overall well-being of employees. Corporate training is crucial for developing the skills needed to meet sustainability challenges. Well-designed training programs can increase employees' awareness of sustainability issues and provide them with the tools to implement sustainable practices in their daily work. Self-determination theory suggests that training can meet the basic psychological needs of autonomy, competence, and relationality, thereby increasing employees' intrinsic motivation.

An example of sustainability-oriented corporate training is the inclusion of specific modules on the principles of sustainability in professional development programs. These modules can cover topics such as waste management, energy efficiency, and corporate social responsibility. In addition, companies can organize workshops and seminars to raise awareness among employees about the importance of sustainability and provide them with the necessary skills to implement sustainable practices.

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Corporate training can also include the use of innovative technologies to promote sustainability. For example, companies can use e-learning platforms to offer online training courses on sustainability topics, allowing employees to access training content in a flexible and convenient way.

Purpose of the article. *Exploring the impact of sustainability on employees' psychological well-being: This objective aims to understand how sustainable practices affect workers' mental health and well-being. Evaluate the effectiveness of corporate training programs: This objective focuses on analyzing how training programs can promote sustainable skills and improve job performance. Identify best practices: This objective aims to identify the most effective strategies for integrating sustainability into work psychology and corporate training.*

The research project aims to:

- *explore how sustainability practices affect employees' psychological well-being;*
- *analyze the effectiveness of corporate training programs in promoting sustainable skills;*
- *identify best practices for integrating sustainability into work psychology and corporate training.*

Methodology. *The research uses a mixed approach, combining qualitative and quantitative methods. In-depth interviews with industry experts and employee surveys will be conducted to gather data on perceptions and experiences related to sustainability. In addition, case studies of companies that have successfully implemented sustainable practices will be analyzed. Work psychology is concerned with studying human behavior in the work context, with a particular focus on employee well-being. Psychological sustainability involves creating work environments that support workers' mental health and well-being. This can be achieved through company policies that promote work-life balance, stress reduction, and the promotion of an inclusive and respectful organizational culture.*

A practical example of sustainability in work psychology is the implementation of psychological support programs for employees. These programs may include one-on-one counseling, support groups, and mental wellbeing workshops. Additionally, companies can adopt flexible work policies that allow employees to better balance their work and personal responsibilities.

The research uses a mixed approach, combining qualitative and quantitative methods. In-depth interviews with industry experts and employee surveys will be conducted to gather data on perceptions and experiences related to sustainability. In addition, case studies of companies that have successfully implemented sustainable practices will be analyzed.

Data collection

Data collection will take place through three main tools:

1. ***In-depth interviews**: Semi-structured interviews will be conducted with industry experts, managers, and employees. The interviews aim to gather detailed information about perceptions and experiences related to sustainability and psychological well-being. The questions will be designed to explore themes such as the impact of sustainable practices on motivation, stress and job satisfaction.*
2. ***Surveys**: Structured surveys will be administered to employees of the selected companies. Surveys will include closed-ended and open-ended questions to collect quantitative and qualitative data. The questions will be based on validated measurement scales, such as the Job Satisfaction Scale and the Perceived Stress Scale.*
3. ***Case study analysis**: Case studies of companies that have successfully implemented sustainable practices will be analyzed. The analysis of the case studies will allow you to identify best practices and lessons learned. The case studies will be selected based on relevance and representativeness criteria.*

Results. *Preliminary results indicate that sustainable practices can significantly improve employees' psychological well-being, reducing stress and increasing job satisfaction. In addition, corporate training programs that integrate sustainability principles are effective in promoting sustainable skills and improving job performance.*

Psychological well-being of employees

In-depth interviews and surveys have revealed that employees who work in companies with sustainable practices report lower levels of stress and higher job satisfaction. These employees highlighted how company policies that promote work-life balance, stress reduction, and the promotion of an inclusive and respectful organizational culture have a positive impact on their psychological well-being. For example, employees of companies that offer psychological support programs and flexible work policies have reported a significant reduction in stress levels and an improvement in the quality of work life.

Employee motivation and engagement

The results indicate that corporate training programs that integrate sustainability principles can increase employees' intrinsic motivation. According to self-determination theory, meeting psychological needs for autonomy, competence, and relationality can lead to greater engagement and job satisfaction. Employees who participate in sustainable training programs reported an increase in intrinsic motivation, feeling more autonomous, competent and connected with colleagues. This has led to increased engagement and job satisfaction.

Work performance

Quantitative analyses have shown that companies that implement sustainable practices and offer sustainable training programs experience improved job performance. Well-trained and motivated employees are more productive and

innovative, contributing to the long-term success of the organization. Companies that have adopted sustainable practices have reported increased productivity, reduced operating costs, and improved overall performance.

Reduction of turnover and absenteeism

Another significant result is the reduction of turnover and absenteeism in companies that adopt sustainable practices. Satisfied and motivated employees are less likely to leave the company and take sick days. Companies that have implemented flexible work policies, psychological support programs and initiatives to promote work-life balance have reported a significant reduction in turnover and absenteeism, contributing to greater stability and continuity.

Corporate Reputation

Companies that adopt sustainable practices and invest in employee well-being have improved their reputation and attracted talent. A good reputation can increase customer and stakeholder trust, leading to increased loyalty and new business opportunities. Companies that communicate their sustainability efforts through sustainability reports, marketing campaigns, and corporate social responsibility initiatives have reported a significant improvement in their reputation.

Contribution to the Sustainable Development Goals

Finally, sustainable practices in work psychology and corporate training can contribute to the United Nations Sustainable Development Goals (SDGs). Companies that adopt sustainable practices can play a key role in promoting environmental, economic, and social sustainability, contributing to a fairer and more prosperous future for all.

Search limitations

The main limitations of the research include the limited sample size and the possible lack of generalizability of the results. Furthermore, the work-in-progress nature of the project means that further data and analysis are needed to confirm the preliminary results.

Managerial implications. *The managerial implications suggest that companies should adopt flexible work policies, psychological support programs and initiatives to promote work-life balance. Additionally, investing in corporate training programs that integrate sustainability principles can increase employees' intrinsic motivation and improve the company's overall performance.*

Research findings on the impact of sustainability in work psychology and corporate training can have several practical implications for organizations. The following are some of the key implications:

1. ***Improved psychological well-being of employees****: Adopting sustainable practices can lead to a significant improvement in the psychological well-being of employees. Creating a work environment that promotes mental health and reduces stress can increase job satisfaction, reduce absenteeism, and improve productivity. Companies can implement flexible work policies, psychological support programs, and initiatives to promote work-life balance;*
2. ***Increased motivation and engagement****: Corporate training that integrates sustainability principles can increase the intrinsic motivation of employees. According to self-determination theory, meeting psychological needs for autonomy, competence, and relationality can lead to greater engagement and job satisfaction. Companies can design training programs that provide opportunities for personal and professional development, strengthening employees' sense of belonging and effectiveness.*
3. ***Reduced turnover and absenteeism****: A sustainable work environment and effective corporate training can help reduce turnover and absenteeism. Satisfied and motivated employees are less likely to leave the company and take sick days. Organizations can benefit from greater stability and continuity, reducing the costs associated with replacing and training new employees;*
4. ***Improved business performance****: Sustainable practices and corporate training can improve the overall performance of the company. Well-trained and motivated employees are more productive and innovative, contributing to the long-term success of the organization. Companies can gain a competitive advantage by integrating sustainability into their operational and human resource development strategies;*
5. ***Strengthening corporate reputation****: Companies that adopt sustainable practices and invest in employee well-being can improve their reputation and attract talent. A good reputation can also increase customer and stakeholder trust, leading to increased loyalty and new business opportunities. Organizations can communicate their sustainability efforts through sustainability reports, marketing campaigns, and corporate social responsibility initiatives;*
6. ***contribution to the Sustainable Development Goals****: Finally, sustainable practices in work psychology and corporate training can contribute to the United Nations Sustainable Development Goals (SDGs). Companies can play a key role in promoting environmental, economic, and social sustainability, contributing to a fairer and more prosperous future for all.*

Originality of the article. *This article contributes to the existing literature by exploring the intersection of sustainability, work psychology, and corporate training. The combination of self-determination theory and stakeholder theory offers an innovative theoretical framework for understanding how sustainable practices can affect employee well-being and business performance.*

The originality of the article lies in its ability to integrate two fundamental theories for the understanding of motivation and organizational behavior: the theory of self-determination and the theory of stakeholders. The theory of self-determination, developed by Deci and Ryan, emphasizes the importance of meeting psychological needs for autonomy, competence, and relationality to promote intrinsic motivation. This approach is particularly relevant in the context of sustainability, as sustainable practices can create a work environment that supports these fundamental needs, improving the psychological well-being of employees.

Stakeholder theory, on the other hand, emphasizes the importance of considering the interests of all stakeholders in the implementation of sustainable practices. This approach allows for a broader and more inclusive vision of sustainability, which is not limited only to environmental aspects, but also includes economic and social dimensions. By integrating these two theories, the article offers a comprehensive and multidimensional theoretical framework for understanding the impact of sustainability in work psychology and corporate training.

In addition, the article stands out for its innovative methodology, which combines qualitative and quantitative methods to obtain a comprehensive understanding of the phenomenon studied. The use of in-depth interviews, surveys, and case study analysis allows the data collected to be triangulated, increasing the validity and reliability of the results. This methodological approach allows for an in-depth exploration of participants' perceptions and experiences, providing a detailed and multifaceted view of the impact of sustainable practices.

A further element of originality of the article is represented by its attention to the practical implications of the results. The article not only provides a theoretical description of the impact of sustainability, but also offers concrete recommendations for companies on how to integrate sustainable practices into work psychology and corporate training. These recommendations can help organizations improve employee well-being, increase motivation and engagement, reduce turnover and absenteeism, improve business performance, and strengthen their reputation.

Finally, the article contributes to the United Nations Sustainable Development Goals (SDGs), highlighting the role of companies in promoting environmental, economic and social sustainability. This multidimensional approach to sustainability can help organizations play a key role in creating a more equitable and prosperous future for all.

Keywords: *Sustainability, Psychological well-being, Corporate training, Intrinsic motivation, Work-life balance, Business Performance*

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New sustainability models in businesses of the italian inland areas

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Abstract

Italian inland areas, characterized by low population density and limited access to essential services, face significant economic and social challenges. In this context, local businesses are adopting new sustainability models to promote territorial development and economic resilience.

This paper analyzes innovative environmental, social, and economic sustainability strategies implemented by businesses in these areas, highlighting the role of local resources, digitalization, and collaborative networks; through a multidisciplinary approach and case studies, the study explores how these models can contribute to the regeneration of entrepreneurial fabric and the creation of shared value for local communities.

Framing of the research. *Italian inland areas represent a unique context characterized by economic fragility, depopulation, and limited access to essential services; however, these regions also possess a rich natural, cultural, and productive heritage that can serve as a catalyst for new sustainable development strategies.*

In this scenario, local businesses play a crucial role in implementing innovative sustainability models that integrate economic growth, environmental protection, and social well-being.

This research aims to analyze how businesses operating in Italian inland areas are adopting and experimenting with new sustainable approaches by leveraging local resources, digital technologies, and cross-sectoral collaboration.

Through an interdisciplinary perspective and case study analysis, the study seeks to highlight both the opportunities and challenges of these models, providing valuable insights for more effective territorial development policies.

Purpose of the paper. *The objective of this research is to analyze and understand how businesses operating in Italian inland areas are developing and adopting new sustainability models to address the economic, social, and environmental challenges of these territories. Specifically, the study aims to:*

- *identify sustainability strategies implemented by local businesses, with a particular focus on circular economy practices, the use of local resources, and digital innovation;*
- *assess the impact of these models on business resilience and territorial development;*
- *explore the role of collaborative networks between businesses, institutions, and local communities in promoting sustainability;*
- *provide useful insights to support policies and initiatives aimed at fostering sustainable business models in inland areas.*

Through a multidisciplinary approach and case study analysis, this research seeks to contribute to the debate on sustainable development strategies in marginal territories, offering concrete recommendations for strengthening the local economic fabric.

Methodology. *This study employs a qualitative research approach to explore new sustainability models in businesses operating in the Italian inland areas; the methodology is structured as follows:*

Research Design: the research follows a case study approach, focusing on selected businesses in Italian inland areas that have adopted innovative sustainability models. This method allows for an in-depth understanding of the specific challenges and strategies employed by these businesses.

Data Collection: data is gathered through a combination of primary and secondary sources:

- *Interviews: semi-structured interviews with business owners, managers, and key stakeholders to gain insights into their sustainability practices, motivations, and outcomes;*
- *Surveys: online surveys targeting a broader group of businesses in these areas to capture general trends and attitudes towards sustainability;*
- *Document Analysis: examination of business reports, sustainability statements, and policy documents to understand the frameworks guiding sustainability initiatives;*
- *Field Observations: site visits to selected businesses to observe sustainability practices in action.*

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Data Analysis: a thematic analysis is conducted to identify recurring patterns and key themes in the data; the analysis follows these steps:

- *Transcription and coding of interview responses to extract major themes;*
- *Statistical analysis of survey results to highlight prevalent sustainability trends;*
- *Cross-case comparison to identify commonalities and differences among businesses.*

Validation and Reliability: to ensure reliability and validity, the study employs triangulation by cross-referencing data from multiple sources; additionally, member-checking is conducted by sharing preliminary findings with participants to confirm accuracy.

Ethical Considerations: all participants provide informed consent before data collection; confidentiality and anonymity are maintained to protect sensitive business information.

This methodology provides a comprehensive framework to explore how sustainability is integrated into businesses in Italian inland areas and the factors influencing their success.

Results. *The analysis conducted on new sustainability strategies in the Italian inland areas has highlighted several key elements characterizing the behavior of local businesses concerning environmental, economic, and social sustainability. Below are the main findings of the research.*

Adoption of Circular Economy Models: many businesses in the Italian inland areas are implementing circular economy practices to reduce resource waste and improve production efficiency; in particular, sectors such as agri-food and craftsmanship are showing a growing trend toward using recycled materials and reusing production waste.

Innovation and Digitalization: the most dynamic businesses are investing in digital technologies to optimize production processes and reduce environmental impact; the adoption of blockchain-based solutions for supply chain traceability and the use of e-commerce platforms to enhance local products are emerging strategies.

Collaboration between Business and Local Communities: the research has identified a strengthening of synergies between businesses, local institutions, and trade associations to promote sustainable initiatives; this collaboration manifests through short supply chain networks, consortia for territorial enhancement, and corporate social responsibility projects.

Challenges and Obstacles: despite positive developments, businesses still face several barriers, including difficulty accessing funding for sustainable innovation, complex bureaucracy, and a lack of specific skills in the field of sustainability.

Impact on Local Economies: the new sustainability models are contributing to greater economic resilience in inland areas, fostering job creation and enhancing territorial resources, however there remains a need for supportive policies to ensure the scalability of these models.

In summary, businesses in the Italian inland areas are adopting innovative sustainability strategies, although structural obstacles still limit their full development; institutional support and the dissemination of best practices could accelerate the transition toward a more sustainable and competitive economic model.

Research limitations. *This study on new sustainability models in businesses of the Italian inland areas presents some limitations that should be acknowledged.*

Firstly, the research is based on a limited sample of businesses, which may not fully represent the diversity of economic activities and sustainability practices across all inland regions of Italy; future studies could expand the sample size to enhance generalizability.

Secondly, the data collection relies primarily on qualitative methods, such as interviews and case studies: while these methods provide in-depth insights, they may introduce subjectivity and limit the ability to establish broader statistical trends; complementing qualitative findings with quantitative analyses could strengthen the robustness of the conclusions.

Thirdly, the study focuses on specific geographic and socio-economic context: the sustainability challenges and solutions identified may not be directly transferable to other regions or countries with different economic structures, policy frameworks, and cultural factors; comparative studies across different geographical areas could provide a more comprehensive understanding of sustainability models.

Lastly, the research period covers a specific timeframe, and sustainability practices in businesses are continuously evolving due to regulatory changes, technological advancements, and market dynamics; a longitudinal approach in future research could capture these evolving trends and offer a more dynamic perspective on sustainability models.

Despite these limitations, this study contributes valuable insights into the emerging sustainability approaches adopted by businesses in the Italian inland areas, paving the way for further research and policy development.

Managerial implications. *The findings of this study offer several important implications for business managers operating in the Italian inland areas.*

Firstly, companies should proactively integrate sustainability into their core business strategies, recognizing that sustainable practices can drive long-term profitability and competitive advantage. Investing in green innovation, circular economy practices, and energy efficiency can reduce costs and improve brand reputation.

Secondly, collaboration among businesses, local institutions, and policymakers is crucial to creating a supportive ecosystem for sustainable growth. Managers should engage in public-private partnerships and industry networks to share best practices, access funding opportunities, and influence sustainability policies.

Thirdly, given the evolving nature of sustainability regulations and consumer expectations, businesses must remain adaptable and responsive. Managers should implement continuous training programs for employees, ensuring that sustainability is embedded in corporate culture and operational processes.

Lastly, digitalization and technological advancements offer opportunities to enhance sustainability efforts. Companies should leverage digital tools such as data analytics, blockchain for supply chain transparency, and smart resource management systems to optimize their sustainability performance.

By adopting these strategic approaches, businesses in the Italian inland areas can not only meet regulatory and social expectations but also enhance their resilience and market positioning in an increasingly sustainability-driven economy.

Originality of the paper. *The paper tries to offer, by means of a multidisciplinary approach and case study analysis, an accurate evaluation of the sustainable development strategies in marginal territories with the final goal of providing effective recommendations for strengthening the fragile local economic fabric remaining within the scope of the holistic concept of sustainability (economic, environmental, social and governance).*

Key words: *green strategies; sustainable development; inland areas; local economies; business strategies; territory*

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Addressing Biodiversity Loss: How can management studies contribute to public policy development?

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Abstract

Biodiversity loss is a grand challenge-a complex, urgent global issue requiring systemic, coordinated action. Deeply interconnected with ecological, economic, and social systems, it cannot be addressed in isolation. More concretely, effective solutions must go beyond science and technology, embracing innovative policies that integrate diverse perspectives and stakeholders. This research analyzes the public policy implications relating to biodiversity loss that emerge from management studies. Through a systematic literature review, this study identifies six key contributions from the management literature that can provide actionable insights for policymakers dealing with biodiversity loss: 1) Knowledge Integration and New Conceptual Thinking, 2) Inclusivity and Cooperation 3) Innovation and Science-based approaches 4) Incentives and Economic Drivers 5) Regulations and Accountability and 6) Agility and Directionality. More concretely, addressing biodiversity loss requires a multidisciplinary approach and a paradigm shift, coupled with adaptive governance capable of responding to evolving socio-ecological dynamics.

Framing of the research. *Biodiversity loss represents one of the most critical challenges of our time, profoundly impacting global economic and social well-being (Boiral and Heras-Saizarbitoria 2017; Leclère et al. 2020). The degradation of ecosystems disrupts essential services, including provisioning, regulating, and cultural functions, which underpin human survival and economic activities (Panwar et al. 2023). Extinction rates are estimated to be 100 to 1,000 times higher than natural levels, with 25% of known species at risk and wild mammal biomass declining by 82% since 1970 (IPBES 2019). These trends highlight the urgency of transformative action at individual, organizational, and societal levels to halt and reverse biodiversity loss (Leclère et al. 2020; Dasgupta 2021).*

The consequences of biodiversity loss extend beyond ecological systems to directly affect economic stability and growth. For instance, the failure of ecosystem services could lead to an estimated global GDP reduction of $2.7 trillion annually by 2030 (Johnson et al., 2021). Key industries, such as agriculture, forestry, and energy, not only depend heavily on biodiversity but also contribute significantly to its decline through habitat destruction, pollution, and overexploitation of resources (IPBES, 2019). Despite these challenges, innovative solutions such as nature-based strategies, regenerative business models, and technological advancements offer pathways for aligning economic activities with ecological health (Hahn and Tampe 2021; Unter et al. 2023). For example, tools like remote sensing and mobile survey platforms are now enabling businesses to monitor biodiversity and improve mitigation measures (White et al. 2021; Westerlaken 2024).

Governments and institutions have started to respond to this crisis with significant funding commitments and regulatory measures, such as the European Union's Biodiversity Strategy for 2030 and the new directive on sustainability reporting (Hassan et al. 2020; Schaltegger et al. 2023). These initiatives underscore the growing recognition that businesses must not only mitigate their impacts on biodiversity but also actively contribute to conservation and restoration efforts. However, the integration of biodiversity considerations into corporate strategies remains limited, often driven by compliance and reputational concerns rather than transformative change (Panwar 2023). Addressing this gap requires robust policies, stakeholder collaboration, and innovative approaches that align economic and ecological priorities (Di Minin et al. 2023; Mäkinen-Rostedt et al. 2023)

The role of public policy in driving transformative development and addressing societal goals, such as biodiversity conservation, has evolved significantly in recent years (Borrás and Schwaag Serger 2022). Historically, Science and Technological Innovation (STI) policies focused on promoting economic growth through mechanisms such as R&D incentives, technology transfer initiatives, and public-private partnerships (Schot and Steinmueller 2018). These traditional frameworks emphasized entrepreneurship and knowledge exchange within innovation ecosystems to enhance technological progress and economic performance (Voß et al. 2009). However, addressing grand challenges like

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biodiversity loss requires a paradigm shift in policymaking, prioritizing societal objectives over purely economic outcomes (Kattel and Mazzucato 2018).

This shift toward societal goals is exemplified by transformative policies that aim to align innovation with the resolution of grand challenges (Bergek et al. 2023). Such policies seek to overcome resistance from entrenched stakeholders and transcend traditional path dependencies by fostering co-creation and innovation alliances that accelerate systemic change (Kemp and Never 2017; Schot and Steinmueller 2018). However, the design and implementation of transformative policies often fall short of their ambitious goals due to misaligned governance frameworks (Borrás and Schwaag Serger, 2022).

Purpose of the paper. *To address these gaps, public policy frameworks must better integrate insights from sustainability and management literature, bridging the disconnect between policy design and practical implementation (Edmondson et al. 2019). This integration requires a multi-layered approach, where governance, coordination, and operational measures are cohesively nested to achieve synergetic outcomes (Schofield 2001; Howlett 2009). Adaptive governance, which emphasizes flexibility, stakeholder engagement, and responsiveness to uncertainty, is critical to addressing the complex socio-ecological challenges of biodiversity loss (Arnold et al. 2023). Without such frameworks, even well-intentioned policies risk failing to deliver meaningful societal change.*

Despite the growing recognition of public policy as a critical driver of transformative societal change, management research has yet to fully embrace its potential to inform policy design and implementation. This disconnect limits the ability of policymakers to harness management research to address complex societal challenges, such as biodiversity loss, climate change, and social inequalities (Dwivedi et al. 2024).

The underrepresentation of policy implications in management literature is compounded by the discipline's focus on theory development over actionable insights. Unlike fields such as medicine, where evidence-based practices directly inform policy and clinical applications, management research often prioritizes abstract theorization, which can obscure its relevance for practitioners and policymakers (Pfeffer 2023). Moreover, the lack of standardization in how researchers articulate policy implications further complicates their accessibility and applicability, leaving policymakers to navigate fragmented and inconsistent insights (Eby and Facteau 2023). This challenge is particularly pronounced in addressing grand challenges, where aligning research findings with practical solutions requires collaboration across disciplines and sectors (Kunisch et al. 2023).

Bridging this gap necessitates a paradigm shift in how management research is conducted, communicated, and contextualized. Collaborative approaches, such as engaging policymakers during the research design phase and co-creating recommendations, have shown promise in making research more actionable (Sharma and Bansal 2023). Additionally, systematic reviews, which synthesize existing evidence, can serve as a powerful tool to translate theoretical knowledge into practical insights for policymaking (Aguinis et al. 2023). However, these efforts remain limited, and the potential of management research to shape policies addressing biodiversity loss and other societal challenges remains largely untapped.

To address this critical gap, this paper seeks to answer the following research question: What public policy implications have been derived from business and management studies, and how can academic findings offer actionable advice to policymakers working on biodiversity loss?

Methodology. *To answer our research question, we conducted a systematic literature review using the methodology described by (Tranfield et al. 2003; Macpherson and Jones 2010; Danese et al. 2018). As highlighted by several authors (Spina et al. 2013; Wang and Chugh 2014), this approach has numerous advantages compared to unstructured translational reviews. In particular, it adopts a replicable, scientific, and transparent process (Tranfield, Denyer, and Smart 2003, p. 209) which allows: (1) minimizing biases and errors; (2) improving the quality of the review process and outcomes (Mihalache and Mihalache 2016); confirming validity through the replication of clear steps during the review process (Wang and Chugh 2014); and synthesizing and organizing accumulated literature in a specific field (Wang and Chugh 2014), often providing academics and practitioners with insights into existing knowledge (Kunisch et al. 2018; Mihalache and Mihalache 2016).*

Furthermore, the systematic literature review is a versatile approach, widely adopted in recent studies published in high-quality scientific journals on different research topics, such as innovation (Adams et al. 2016). For these reasons, we believe that the systematic literature review is the most suitable method for our research objective, which is to offer a systematic and in-depth review of the policy implications emerging from management studies on biodiversity.

To address this, we aim to conduct a systematic literature review, critically analyzing the contributions of management academia to the development of public policy implications for biodiversity protection. Specifically, the methodology consists of seven steps.

In the first step, we built on the literature review of (Llorente-Culebras et al. 2023) to build our base keyword search. To ensure comprehensiveness, we searched both in Web of Science (WoS) and Scopus databases. We conducted the search in the title, abstract and keywords. Our search terms encompassed biodiversity and its various dimensions, including functional, trait, phylogenetic, evolutionary, taxonomic, and species diversity, as well as species richness. This resulted in 484,697 papers.

Specifically, the first step included the following keywords:

biodiversity OR "functional diversity" OR "trait diversity" OR "phylogenetic diversity" OR "evolutionary diversity" OR "taxonomic diversity" OR "species diversity" OR "species richness"

In Step 2, recognizing that biodiversity encompasses a broader spectrum of concepts, we expanded the keyword search to include the concept of ecosystems. Within management and business research, there is an expanding body of literature related to "innovation ecosystems" or "entrepreneurial ecosystems", thus necessitating a focused search on specific ecosystem terms. Thus, we followed the IUCN Global Ecosystem Typology (Keith et al. 2020) to derive more detailed ecosystem definitions associated with biodiversity. The query included natural, terrestrial, subterranean, marine, freshwater, and atmospheric ecosystems, along with ecosystem services, leading to 890,855 papers.

biodiversity OR "functional diversity" OR "trait diversity" OR "phylogenetic diversity" OR "evolutionary diversity" OR "taxonomic diversity" OR "species diversity" OR "species richness" OR "natur ecosystem*" OR "terrestrial ecosystem*" OR "subterranean ecosystem*" OR "marine ecosystem*" OR "freshwater ecosystem*" OR "atmospheric ecosystem*" OR "ecosystem* service**

To refine our dataset, we applied language, time, and document-type limitations, selecting only English-language articles published between 2011 and 2023 (Step 3). The decision to start in 2011 was made because this year marked the beginning of the United Nations Decade on Biodiversity (UN, 2011), during which an international strategy for biodiversity protection was initiated, guided by the Aichi Biodiversity Targets. These targets were identified as the first globally recognized concrete policy goals of the 21st century (IPBES, 2019; Secretariat of the Convention on Biological Diversity, 2020).

In Step 4, we filtered the results by subject categories relevant to our study. In Web of Science, we included Management, Business, Business Finance, Social Sciences Interdisciplinary, and Multidisciplinary Sciences, while in Scopus, we focused on Business, Management and Accounting, Social Sciences, and Multidisciplinary studies, reducing the dataset to 67,641 papers.

To ensure research quality, we applied journal ranking criteria in Step 5, selecting only papers published in ABS-ranked 3, 4, and 4 journals, following the approach of (Acciarini et al. 2023; Bonfanti et al. 2024). This step refined the dataset to 2,263 articles.*

In the sixth step, we removed 585 duplicates. This resulted in 1,678 papers.

Finally, in Step 7, we applied exclusion criteria, removing papers that were not directly relevant (e.g., focusing on innovation ecosystems or team functional diversity), along with review articles, conceptual papers, and studies lacking explicit policy implications following the approach of Aguinis et al. (2023). We then clustered the policy implications into themes as proposed in the result section.

Results. *Six key themes emerge from management studies that offer actionable insights for biodiversity policy:*

Knowledge Integration and New Conceptual Thinking - Biodiversity loss requires moving beyond disciplinary silos to integrate diverse forms of knowledge. Framing biodiversity loss as a systemic challenge helps policymakers incorporate scientific evidence, local knowledge, and social values into policy design.

Inclusivity and Cooperation - Effective biodiversity governance requires multi-stakeholder collaboration. Policies should prioritize participatory decision-making, ensuring local communities and marginalized groups are included. Revenue-sharing schemes and buffer zone programs help align conservation goals with local socio-economic needs.

Innovation and Science-Based Approaches - Integrating science and technology enhances biodiversity policymaking. Tools such as remote sensing, real-time monitoring, and Integrated Assessment Models improve decision-making and policy evaluation. Collaborative knowledge-sharing platforms facilitate adaptive governance.

Incentives and Economic Drivers - Economic mechanisms such as Payments for Ecosystem Services (PES), tax incentives, and eco-labeling encourage businesses and communities to support biodiversity conservation. Well-designed incentives foster long-term stakeholder engagement and equitable benefit distribution.

Regulations and Accountability - Structured regulations and accountability mechanisms ensure compliance with biodiversity goals. Transparent reporting systems, biodiversity disclosure mandates, and adaptive regulatory frameworks strengthen conservation efforts and prevent policy fragmentation.

Agility and Directionality - Policies must be adaptable to evolving environmental and socio-economic conditions. Regional experimentation and multi-level governance structures enable iterative policy improvements, allowing for localized solutions that scale up to broader conservation efforts.

Research limitations. *Future research should further investigate how nested policy frameworks-which align governance structures across local, national, and global levels-can enhance systemic resilience, ensuring that biodiversity policies remain responsive, equitable, and adaptable to emerging socio-ecological challenges. In particular, understanding how different governance layers interact and influence each other is critical for preventing policy fragmentation and fostering coherent, long-term strategies. Additionally, further exploration is needed on the role of*

institutional learning and feedback loops in biodiversity governance, ensuring that policies are continuously refined based on new scientific insights, technological advancements, and stakeholder engagement.

Managerial and policy implications. *From a governance perspective, knowledge must be disseminated through systemic feedback loops to inform iterative policy improvements. Mechanisms such as participatory research platforms, open data-sharing initiatives, and cross-sectoral advisory bodies can enhance learning capacity within the policy system (Edmondson et al., 2019). Without such systemic knowledge flows, policies risk remaining static and fragmented, unable to respond to emerging biodiversity threats.*

Systems theory emphasizes interconnectivity and nested hierarchies-subsystems that are interwoven within larger governance structures (Schad and Bansal 2018). *In biodiversity conservation, multi-level cooperation among governments, businesses, NGOs, and local communities is essential to ensuring cohesive and synergistic policies (Voß, Smith, & Grin, 2009). Our review highlights the role of inclusive decision-making in enhancing policy legitimacy and effectiveness, particularly in cases where indigenous knowledge and local stakeholder engagement shape governance outcomes.*

Hierarchical structures must be designed to support decentralized, bottom-up engagement, ensuring that local actors influence higher-level policy decisions rather than merely being subject to top-down mandates (Schot & Steinmueller, 2018). Instruments such as stakeholder forums, co-management agreements, and multi-tier governance platforms facilitate cooperation, creating a governance structure that mirrors the complexity of biodiversity systems.

A defining feature of complex systems is their capacity for self-organization and adaptation in response to environmental changes (Schneider et al. 2017). *In policymaking, this necessitates evidence-based innovation, ensuring that biodiversity conservation strategies remain scientifically robust and responsive to evolving ecological conditions (Schot & Steinmueller, 2018). Management research highlights the role of science-policy interfaces, such as big data analytics, environmental monitoring, and AI-driven biodiversity modeling, in enhancing the predictive capacity of governance systems. These tools enable policymakers to anticipate biodiversity trends and adjust interventions in real time.*

However, technology-driven innovation alone is insufficient without a nested governance framework that ensures knowledge generated at one level of the system informs decision-making at others (Edmondson et al., 2019). Adaptive policymaking structures, such as regulatory sandboxes and experimental policy zones, allow for policy refinement through iterative learning.

Economic systems are deeply interwoven within socio-ecological frameworks, with market mechanisms often serving as either drivers of biodiversity loss or levers for systemic transformation (Bergek, Hellsmark, & Karltorp, 2023). Our findings emphasize the role of economic incentives-including payments for ecosystem services (PES), tax benefits for conservation, and biodiversity credits-in realigning market incentives with ecological priorities. From a systems perspective, these mechanisms function as feedback loops, altering the behavior of actors by integrating long-term ecological considerations into economic decision-making (Schneider et al., 2017).

However, economic incentives must be nested within broader regulatory frameworks, ensuring they do not merely offset biodiversity harm but actively contribute to systemic regeneration. This requires policymakers to structure incentives in ways that foster cumulative, cross-sectoral benefits, such as linking PES schemes with community development programs to ensure equitable distribution of conservation benefits.

In complex systems, regulatory mechanisms act as stabilizers, providing constraints that prevent systemic degradation while enabling positive feedback loops for sustainability (Schneider et al., 2017). Our review underscores the necessity of strong accountability mechanisms, including mandatory biodiversity disclosures, corporate governance reforms, and stricter compliance frameworks, to align corporate behavior with conservation goals (Panwar et al., 2023).

However, rigid regulatory structures risk creating inertia, limiting the system's ability to adapt to emerging challenges. Thus, regulations must be designed with built-in flexibility, enabling periodic reassessment and recalibration based on real-time biodiversity data. Polycentric governance models, which distribute regulatory authority across multiple levels, offer a potential solution, ensuring that regulatory oversight is both stringent and context-sensitive (Arnold et al., 2023).

Finally, a systems approach to biodiversity policy must embrace agility and directionality, ensuring that governance structures remain adaptable yet mission-driven (Schot & Steinmueller, 2018). Agility is crucial in responding to emerging ecological threats, technological advancements, and socio-economic shifts, while directionality ensures that policies are not reactive but aligned with long-term sustainability goals. Our findings suggest that successful biodiversity policies balance regional experimentation with strategic coherence, ensuring that local pilot programs inform broader policy transformations.

From a systems perspective, policy spillover effects must be harnessed, ensuring that successful biodiversity initiatives cascade across sectors and jurisdictions. Regional policy coordination, cross-border conservation strategies, and transnational governance frameworks can enhance the systemic impact of biodiversity interventions.

Originality of the paper. *By framing biodiversity policy as an interconnected and dynamic system, this study lays the groundwork for a structural approach that bridges management research with policymaking. The six key clusters identified-knowledge flows, multi-level cooperation, adaptive innovation, economic incentives, regulatory frameworks, and agility-serve as the foundation of a systemic governance model. Rather than treating these elements in isolation, our findings emphasize their interdependence, highlighting how an integrated policy approach can create self-reinforcing mechanisms that drive transformative change in biodiversity governance. Drawing from systems theory, we argue that*

these policy dimensions must be understood as interdependent components of an adaptive system. Policy interventions must not be designed in isolation but rather as part of a broader governance framework that considers hierarchies, feedback loops, and dynamic interactions between system actors (Schad & Bansal, 2018; Schneider et al., 2017).

A fundamental principle of systems theory is that the capacity of a system to adapt and evolve is dependent on its ability to process and integrate information from multiple sources (Schneider et al., 2017). In biodiversity policymaking, this translates into the need for knowledge integration and new conceptual thinking, incorporating scientific expertise, local knowledge, and interdisciplinary insights. Traditional policy frameworks often suffer from reductionist thinking, addressing biodiversity loss as a series of isolated challenges rather than as part of a broader socio-ecological system (Grewatsch et al. 2023). A systems perspective calls for transdisciplinary collaboration, ensuring that decision-making reflects both scientific evidence and context-specific socio-economic realities.

Key words: *biodiversity; systematic literature review; policy; system theory; complexity*

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Leading data-driven transformation towards sustainability: the role of transformational leadership and digital-enabled capabilities

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Abstract

This study explores the complex relationship between data-driven transformation and sustainability-oriented innovation (SOI). While digital transformation is often seen as a driver of sustainability initiatives, our findings suggest that its impact is not straightforward and depends on key contextual factors. We examine the moderating roles of transformational leadership and digital-enabled capabilities to assess how organizations navigate the trade-offs between digitalization and sustainability. Analysing a sample of 314 Italian companies, we find that transformational leadership strengthens the positive effect of data-driven transformation on SOI, whereas digital-enabled capabilities unexpectedly weaken this relationship, suggesting the emergence of complex trade-offs between digitalisation and sustainability priorities. These results highlight the need for a strategy that places emphasis on particular characteristics of leadership and integrates competing objectives into a coherent and shared vision. The study contributes to the current literature on sustainability offering managerial implications into the leadership and resource configurations necessary for achieving sustainable innovation.

Framing of the research. *Over the last two decades, sustainability has evolved from a reactive, compliance-based approach to a proactive, core component of organisational strategy (Lubin and Esty, 2010). Many organisations adopt sustainability-oriented innovation (SOI) practices to enhance competitiveness. In the context of this study, SOI is defined as "a process deliberately seeking outcomes to improve current environmental and/or social performance while simultaneously finding competitive advantage" (Kennedy et al., 2017, p.713).*

Research reveals that sustainability can drive significant innovation, reduce costs, and open new revenue streams, making it a powerful competitive advantage (Nidumolu et al., 2009). However, despite the benefits and the regulatory pressure to introduce SOI, its implementation presents several obstacles. One of the primary challenges is the upfront significant investment required, with benefits that may not be visible in the short run (Doni and Fiameni, 2023). Second, balancing environmental, social, and economic goals is complex and this complexity is further exacerbated by the organisational structures, and the presence of different business streams, functions and projects (Keeble, 2003). Finally, a sustainability focus requires managers to integrate SOI initiatives into existing business processes without disrupting the traditional company's operations (Harsanto et al., 2024, Wang et al., 2023).

To overcome these challenges the literature suggests that digital transformation could enhance a company's capabilities achieving a better alignment between sustainability goals, innovation outcomes, and company performance (Ashaari et al., 2021, Behl et al., 2022, Jibril et al., 2024, Yu et al., 2021). Particularly, we focus on the role of data analytics in supporting business model transformation: data analytics enhances decision-making by enabling companies to leverage large volumes of information, characterised by high velocity and significant variety (Mcafee et al., 2012). The effective management and exploitation of data can provide organisations with at least three enhanced capabilities: spotting customer behaviour, enabling real-time market responsiveness and fostering data-driven market ambidexterity (De Luca et al., 2020). Organizations can leverage these enhanced capabilities to promote and achieve SOI goals (Fosso Wamba et al., 2015). This transformative process is known as data-driven transformation: the process by which organisations recognise data as a strategic asset, leveraging it to inform core decision-making, generate value through internal optimisation and external monetisation, and undergo a cultural, strategic, and leadership shift to fully integrate data-driven practices across all levels of the organisation.

Big data technologies and analytics have attracted considerable attention from practitioners because of their potential to drive the development of new digital services and support the achievement of sustainability goals (Deloitte, 2012). Existing literature confirms that digital tools, and particularly big data analytics, can enhance environmental sustainability by optimising resource consumption, reducing waste, and improving supply chain efficiency (Dubey et al., 2019a, Dubey et al., 2019b, Guandalini, 2022). The extensive use of digital technologies indeed brings significant changes

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to both businesses and society (Van Veldhoven and Vanthienen, 2022). Also, they can play a critical role in enabling sustainability processes (Melville, 2010). Carlsson et al. (2022) point out that digitalization is crucial for an organisation to achieve sustainability leadership, conform to sustainability objectives, and exchange information with consumers and stakeholders throughout the circular life cycle.

This argument can be expressed more formally by advancing the following hypothesis:

H1a: *There is a positive relationship between data-driven transformation and sustainability-oriented innovation.*

However, it is also important to note that a positive relation is not a unanimous finding among scholarly literature (Guandalini, 2022). There is a generally optimistic attitude towards the opportunities offered by digital technologies and data management, however, these technologies can be potentially disruptive if not adequately managed (Ciulli and Kolk, 2023). Verbeke and Hutzschenreuter (2021) refer to a bright as well as a dark side of digital transformation arguing that digital transformation may enable new revenue streams but also heighten unintended and unexpected digital vulnerabilities. One major risk is cybersecurity, as the adoption of digital technologies increases exposure to data breaches and attacks (Kraemer-Mbula et al., 2013). In addition, the fragility of digital infrastructures poses another vulnerability which can hinder widespread adoption and challenge organisational governance (George et al., 2020, Koutsikouri et al., 2018). Technological obsolescence further complicates digital investments, as organisations may struggle to commit to costly digital resources that quickly become outdated (Hitt et al., 1997). This is exacerbated by the nature of sustainability initiatives, which often require iterative processes with trials and errors, leading to further pressure on digital systems (Baldassarre et al., 2020, Elf et al., 2022). The threat of job losses due to automation and the adoption of digital technologies is another potential disruption, with human resources being displaced or reshaped by the digital transformation (Basu et al., 2023). Furthermore, the challenge of digital inclusion—finding and retaining qualified talent—creates an additional barrier, particularly in aligning digital transformation with sustainability goals (Pekkala, 2022). This trade-off between digital transformation and sustainability initiatives is particularly evident in smaller companies with limited resources and narrow strategic vision (Denicolai et al., 2021).

These arguments underpin the formulation of a concurrent hypothesis with respect to H1a:

H1b: *There is a negative relationship between data-driven transformation and sustainability-oriented innovation.*

To achieve alignment of strategic goals and the development of strategies that balance between concurrent objectives, the role of leadership becomes crucial (Weiner and Mahoney, 1981, Wiengarten et al., 2017). We specifically refer to transformative leaders who can manage innovation by inspiring and supporting employees to collectively achieve a shared goal. Transformational leadership is defined as the leadership capability of "moving the follower beyond immediate self-interests through idealized influence (charisma), inspiration, intellectual stimulation, or individualized consideration" (Bass, 1999, p.10). Transformational leaders possess a clear vision of the firm's current and future trajectory, especially in dynamic markets (Avolio and Bass, 1995). They articulate and communicate this vision with conviction, inspiring employees to believe in and engage with the leader's vision (Schiuma et al., 2021, Singh et al., 2020, Zhu et al., 2005).

Sustainable oriented practices are actively shaped and spread across the organisation by motivated leadership (Akhtar et al., 2018, Çop et al., 2020, Piwowar-Sulej and Iqbal, 2023). Transformative leaders persuade followers to reach high performance and their presence is considered one of the most important organisational factors related to boost innovation (Rosing et al., 2011). The characteristics of the leaders, combined with the organisational context strongly influences the strategic trajectory (Papadakis and Bourantas, 1998).

We argue that data-driven transformation may be a good contributor to SOI, but an effective leadership is also required. While digital technologies provide the tools for business transformation, it is strong leadership that ensures these tools are used effectively by setting clear goals and empowering employees to promote sustainability initiatives (Mcafee et al., 2012).

These considerations allow to formulate the following hypothesis:

H2: *Transformational leadership positively moderates the relationship between data-driven transformation and sustainability-oriented innovation.*

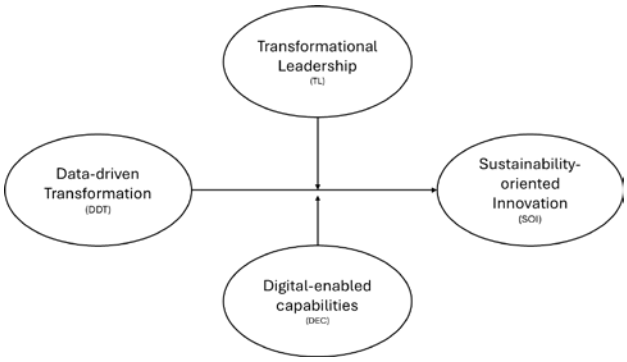
In parallel to transformational leadership, the digital context in which organisations operate also shapes their sustainability orientation; Indeed, organisations with a strong digital orientation are more likely to achieve SOI goals because digitization provides better control over the process, enhancing transparency and manageability of resources (Hojnik et al., 2023, Mishra et al., 2022). This orientation depends on the possession of digital-enabled capabilities together with a digital transformation culture (Mishra et al., 2023). Digital-enabled capabilities reflect the company ability to actually realise the transformative potential and leverage digital infrastructures and information management to support high quality decisions to achieve the desired performance (Levallet and Chan, 2022). These digital-enabled capabilities extend beyond static technological assets; they are dynamic organisational competencies that contribute to improved financial outcomes, enhanced productivity, greater agility, higher customer satisfaction, and more effective collaboration and knowledge management (Levallet and Chan, 2022). Importantly, such capabilities are cultivated through ongoing digital transformation processes, which continuously refine and reinforce successful SOI practices (Mishra et al., 2023). When data-driven transformation is integrated with strong digital-enabled capabilities, organisations create a synergistic environment where digital tools are not only adopted but are also optimally exploited. This interaction implies that the combined presence of data-driven transformation and digital-enabled capabilities enhances the positive influence on SOI more than each single factor could achieve independently.

These considerations allow to formulate the following hypothesis:

H3: *Digital-enabled capability positively moderates the relationship between data-driven transformation and sustainability-oriented innovation.*

As shown in Figure 1, our conceptual model posits that data-driven transformation represents the primary driver of sustainability-oriented innovation, while transformational leadership and digital-enabled capabilities function as moderators that can enhance the effectiveness of data-driven initiatives.

Fig. 1: Conceptual model



Purpose of the paper. *The main objective of this paper is to investigate the complex relationship between digital transformation and sustainability initiatives, with particular attention to how data analytics drives and shapes this trajectory. By offering empirical evidence, the study offers managerial guidance on how to align digital strategies with sustainability priorities, especially when organisations face the challenge of balancing multiple objectives.*

The study also aims to establish if and how transformational leadership can reorient the focus of data-driven initiatives towards a clear sustainability strategy. By articulating a clear vision and fostering a positive environment, transformational leaders inspire trust and commitment and motivate employees to look beyond short-term gains.

Finally, the paper aims to clarify which set of digital resources and capabilities are essential to achieve sustainability objectives. Digital-enabled capabilities represent the tangible resources and competencies necessary for leveraging data analytics effectively. They ensure that digital transformation efforts are not merely adopted but are optimally integrated into operational practices to achieve sustainable outcomes.

Methodology. *The data for this study is collected through a questionnaire. The empirical analysis is focused on Italian companies. The study deliberately targets highly innovative companies that are likely to be in a process of digital transformation or sustainability transition. The presence of a dedicated leader for innovation, sustainability or digitalisation was used as a viable indicator. Data collection took place between July and December 2023. The questionnaire received a total of 314 complete responses yielding a response rate of 13%. The sample contains a mix of small (51%), medium (7%) and large companies (42%) from different industries. Information on the variables are included in Table 1.*

Tab. 1: Variables

Variable name	Type	Description	Operationalisation	Originally developed by	α
Sustainability-oriented innovation (SOI)*	Dependent variable	Improving ecological sustainability (e.g. reduction of environmental impact) is a top priority We assess customers' views of green products/services through market analysis Multiple departments are engaged in sustainability-related initiatives. We consider sustainability as an opportunity for differentiation Non-market stakeholders* are involved in design and development We actively engage external partners to gather innovative ideas We leverage data and digital solutions (to promote sustainability) Improving social sustainability (e.g. inclusion, work-life balance, etc.) is a top priority Sustainability goals pushed us to a radical transformation	1 - 5 Likert scale (1 strongly disagree - 5 strongly agree)	(Maletič et al., 2016)	0.878
Data-driven Transformation (DDT)*	Independent variable	My company is transforming in the way we make money form data We generate remarkable value from data we collect We exchange strategic data with key partners and/or supplier Digitalization is today at the core of our competitive advantage Digitalization pushed us to a radical transformation	1 - 5 Likert scale (1 strongly disagree - 5 strongly agree)	(Proksch et al., 2021)	0.712
Transformational Leadership (TL)*	Moderator	I seek differing perspectives when solving problems I get others to look at problems from many different angles I help others develop their strengths I spend time teaching and coaching I help others develop their strengths I am an inspiration to other people I make other people enthusiastic about assignments	1 - 5 Likert scale (1 strongly disagree - 5 strongly agree)	(Avolio and Bass, 1995, Stock et al., 2016)	0.856

Digital-enabled capabilities (DEC)*	Moderator	In the last 3 years, the introduction of digital solutions in your company has improved: … cost reduction … productivity and process optimization … company agility … customer satisfaction … collaboration between employees and/or departments … learning and knowledge management … quality of work	1 - 5 Likert scale (1 strongly disagree - 5 strongly agree)	(Levallet and Chan, 2022, Rasool et al., 2021)	0.857
AGE_FIRM	Covariate	Age of the firm	Year count since the foundation	---	---
BUDGET	Covariate	Budget of the manager filling the survey (proxy for resources)	% of company revenues	---	---
DIR_REP	Covariate	Proxy for authority and independence of the respondent	1= directly reports to the CEO; 0=all other	---	---
FOREIGN	Covariate	Degree of internationalisation	% of foreign sales	---	---
LEAD_INN	Covariate	To account for different strategic focus	1=innovation leader; 0=all other	---	---
LEAD_SUS	Covariate	To account for different strategic focus	1=sustainability leader; 0=all other	---	---
MANU	Covariate	To capture industry effect	1=manufacturing industry; 0=all other	---	---
SIZE	Covariate	To capture dimension effect	Log of turnover	---	---

* Variable scores are generated via principal factors extraction with varimax rotation

The research hypotheses are tested on the following regression equations:

(1) $SOI = c + \beta_1 DDT + \beta_2 TL + \beta_3 DEC + \beta_4 (DDT * TL) + \beta_5 (DDT * DEC) + control + \varepsilon$

where SOI is sustainability-oriented innovation, c is the constant or intercept, β_n *represents the estimated coefficients, DDT is data-driven transformation, TL is transformational leadership, DEC is digital-enabled capabilities, control represent the covariates, and* ε *is the error terms. Preliminary results*

Results (preliminary)

Table 2 presents the preliminary results of the regression analysis.

Tab. 2: Regression analysis

VARIABLES	(1) SOI	(2) SOI	(3) SOI	(4) SOI	(5) SOI	(6) SOI	(7) SOI
AGE_FIRM	-0.000649	-0.000481	-0.000521	-0.000618	-0.000414	-0.000509	-0.000641
	(0.00195)	(0.00196)	(0.00197)	(0.00195)	(0.00196)	(0.00195)	(0.00193)
BUDGET	0.00184	0.00112	0.000997	0.00122	0.00120	0.000798	0.000910
	(0.00590)	(0.00599)	(0.00603)	(0.00595)	(0.00598)	(0.00596)	(0.00591)
DIR_REP	-0.291**	-0.287**	-0.287**	-0.264**	-0.294**	-0.287**	-0.264**
	(0.123)	(0.123)	(0.123)	(0.122)	(0.123)	(0.123)	(0.121)
FOREIGN	0.00433*	0.00434*	0.00438**	0.00444**	0.00452**	0.00476**	0.00485**
	(0.00221)	(0.00221)	(0.00222)	(0.00219)	(0.00221)	(0.00221)	(0.00218)
LEAD_INN	-0.553***	-0.553***	-0.549***	-0.550***	-0.571***	-0.608***	-0.605***
	(0.164)	(0.164)	(0.165)	(0.163)	(0.164)	(0.164)	(0.164)
LEAD_SUS	0.535***	0.541***	0.542***	0.528***	0.549***	0.531***	0.518***
	(0.113)	(0.113)	(0.114)	(0.112)	(0.113)	(0.113)	(0.112)
MANU	-0.113	-0.105	-0.105	-0.0628	-0.0830	-0.0808	-0.0394
	(0.147)	(0.147)	(0.147)	(0.146)	(0.148)	(0.147)	(0.146)
SIZE	0.0663***	0.0653***	0.0656***	0.0640***	0.0661***	0.0646***	0.0632***
	(0.0186)	(0.0186)	(0.0187)	(0.0185)	(0.0186)	(0.0185)	(0.0184)
DDT		0.0382	0.0384	0.0419	0.0408	0.0321	0.0357
		(0.0533)	(0.0534)	(0.0527)	(0.0532)	(0.0531)	(0.0525)
TL			-0.0124	-0.0147			-0.0127
			(0.0523)	(0.0516)			(0.0513)
DDT_TL				0.161***			0.160***
				(0.0531)			(0.0528)
DEC					0.0750	0.0984*	0.0965*
					(0.0527)	(0.0537)	(0.0531)
DDT_DEC						-0.0963**	-0.0963**
						(0.0481)	(0.0475)
Constant	-0.224	-0.219	-0.224	-0.229	-0.220	-0.170	-0.179
	(0.262)	(0.262)	(0.263)	(0.260)	(0.262)	(0.262)	(0.259)
Observations	314	314	314	314	314	314	314
R-squared	0.194	0.196	0.196	0.220	0.201	0.212	0.235

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The effect of data-driven transformation (DDT) is consistently non-significant across all models suggesting that DDT, when considered in isolation, does not directly influence SOI outcomes. Although the non-significant findings support and confirm the idea of complexity of the relationship between a data-driven strategy and a sustainability orientation, the statistical analysis does not support either H1a or H1b. This could mean that the relationship between DDT and SOI is more complex than a simple positive or negative linear association and could be contingent on other contextual factors.

One of the key contextual factors examined is transformational leadership (TL). Although TL alone is not significantly related to sustainability-oriented innovation (SOI), the interaction between data-driven transformation (DDT) and TL is positive and statistically significant. This indicates that the effect of DDT on SOI is contingent upon the presence of TL. More specifically, data-driven transformation positively influences SOI only when transformational leadership drives the process. These findings support H2 and highlight the critical role of the leadership in motivating other members within the organization towards the achievement of sustainability goals.

Another key contextual factor is digital-enabled capability (DEC), which exhibits a positive main effect on sustainability-oriented innovation (SOI), suggesting that these capabilities can support sustainability initiatives. However, contrary to the expectations, the interaction between data-driven transformation (DDT) and digital-enabled capability (DEC) is negative and statistically significant. This indicates that when organisations engage in DDT and simultaneously achieve high levels of digital-enabled capabilities, they tend to place less emphasis on sustainability projects. While the literature suggests that organizations can leverage DEC to achieve SOI, our findings show that companies with a pronounced focus on digital transformation may not strategically prioritise sustainability-oriented innovation, as the two objectives appear conflicting. The results of the empirical analysis do not support H3 but instead reveal a clear trade-off that organisations must acknowledge when defining their strategic objectives.

In summary, our findings demonstrate that the relationship between digital transformation and sustainability is complex and marked by significant trade-offs, even in larger companies with more resource availability. The transition toward sustainability remains a challenging process. However, our results indicate that strong transformational leadership—characterised by clear objectives and employees' empowerment—can drive these sustainability initiatives towards a positive outcome.

Research limitations. *Some limitations should be acknowledged. First, this study is preliminary, and some of the findings may require further elaboration with a check for robustness. Second, the study is based on cross-sectional data, which limits the ability to infer causal relationships. A third potential limitation is the geographic context of the companies in our sample: cultural and economic factors unique to the Italian region might not apply to other countries.*

Managerial implications. *Managerial implications can take at least three directions. First, managers must recognise that pursuing digital transformation and sustainability-oriented innovation concurrently may lead to trade-offs. A balanced strategic focus is required to ensure that investments in digitalisation do not inadvertently deprioritise sustainability initiatives. Managers should therefore allocate resources wisely, ensuring that digital infrastructures support sustainability goals rather than displace them.*

Second, the findings emphasise the critical role of transformational leadership in driving sustainability outcomes. Organisations should invest in leadership development programs that foster a clear vision, empower employees, and promote a long-term focus on sustainability.

Third, the findings suggest that organisations need to adopt integrative strategic frameworks that reconcile the competing demands of digital transformation and sustainability. This requires cross-functional collaboration, shared accountability, and integrated objectives with aligned performance evaluations. Emergent roles such as the Chief Sustainability Officers will become increasingly critical in steering organisations toward sustainability goals. Sustainability leaders are expected to work closely with other executives to visualise common objectives and align the company's vision with a coherent sustainability strategy.

Originality of the paper. *The originality of this paper lies in its comprehensive analysis of how organisations manage multiple strategic objectives and foci. It offers an alternative approach to the general optimistic attitude towards digital technologies emphasising the emergent trade-offs and potential conflicts that originate when firms invest heavily in digitalisation. Also, the paper focuses on the critical role of leadership characteristics as a key important organisational resource in managing trade-offs.*

Key words*: Sustainability-oriented innovation; Data-driven transformation; Digital-enabled capability; Transformational leadership; Trade-offs.*

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Social innovation and well-being: exploring the relationship through a bibliometric analysis

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Abstract

The study explores the relationship between social innovation and well-being through a bibliometric analysis. The research highlights emerging trends, conceptual structure, and global collaborations and reveals the impact of social innovation across different contexts, emphasising its role in improving the quality of life. The theoretical and practical implications provide insights for policies and sustainable development strategies.

Framing of the research. *Social innovation is a research field gaining increasing scholars' attention (Solima et al., 2021). The research on the topic has consistently expanded in the last decade by embracing various approaches and diverse disciplines (Janik et al., 2021). Such multidisciplinarity shows evidence of the concept analysis fragmentation, highlighting the absence of a commonly accepted definition (Ziegler, 2017; Cajaiba-Santana, 2014; Pol and Ville, 2009). However, the scientific debate encompassing several disciplines has fostered a meaningful discussion (Van der Have and Rubalcaba, 2016), recognising the importance of the social innovation process in finding solutions to specific social problems by exploiting creative paths (Solis-Navarrete et al., 2021).*

Social innovation has been recognised as a collaborative concept (Van der Have and Rubalcaba, 2016) focusing on social progress (Rocha et al., 2023; Cajaiba-Santana, 2014) that promotes "social inclusion, quality of human life and well-being, changing social relationships, engaging and mobilising beneficiaries, creating new roles and relations, enhancing society's capacity to act and empowering its beneficiaries" (Dias and Partidário, 2019; pag. 1). It is driven by social concerns that lead to developing solutions to improve social conditions (Dowson and Daniel, 2010) by producing a social impact that contributes to satisfying "human and societal well-being needs" (Rocha et al., 2023; pag. 3). Accordingly, van der Have and Rubalcaba (2016) encouraged researchers in the field of innovation studies to explore social innovation when interested in people's well-being. Moreover, by focusing on subjective well-being (Ryff et al., 2021; Diener et al., 2018), Engelbrecht (2018) emphasises the importance of considering it as an additional metric when evaluating social innovations to understand the benefits to individuals and society. Similarly, Calò et al. (2024) suggest that individuals' involvement in social innovation during emergencies can influence "the impact on their health and well-being" (pag. 1724) and studying the individuals' emotional responses and community ethos can help develop social innovation initiatives based on inclusion.

Purpose of the paper. *Today, scientific literature does not show a clear picture of the relationship between social innovation and well-being studies, making it challenging to identify the current and emerging trends in the literature and the conceptual and intellectual structure of studies exploring this link to give direction for a more concrete contribution on both theoretical and practical side. Therefore, this study aims to fill this gap by answering the following research questions: What relationship exists between social innovation and well-being studies? and particularly, how do social innovation, across global contexts, impact well-being according to the literature? What are the current trends and evolution of publications and citations in this research field? What is the conceptual and intellectual structure of studies dealing with social innovation and well-being?*

Methodology. *To study the relationship between social innovation and well-being in the scientific literature, we opted for a bibliometric analysis using Biblioshiny, an interactive R-based application (Huang et al., 2021; Aria and Cuccurullo, 2017;). Data were extracted from the Scopus database using two sets of keywords combined with boolean operators. Words such as "well-being", "life satisfaction", "quality of life", and "social innovation" were adopted, and 458 articles were identified. Then, after applying filters based on subject area, document type, time and language, 175 articles were selected for the analysis. Bibliometric analysis was carried out by calculating key bibliometric indicators, such as the number of articles, average citations per article (ACA) and year (ACY), and the time distribution of publications. The analysis focused on identifying the most cited and influential articles in the field, assessing publications' volume and temporal distribution, and analysing co-authorship networks to visualise research collaboration patterns (Majumder and Biswas, 2023). A network analysis was also conducted to visualise collaborations between authors in different countries, and thematic mapping was used to identify key topics and monitor their evolution over time. The*

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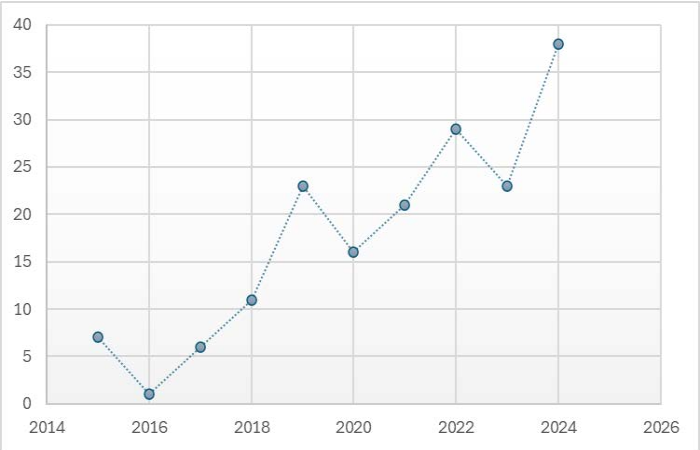
conceptual map highlighted the centrality of concepts such as "social innovation" and "well-being" among the visualisations generated. Such an approach has provided a comprehensive view of research dynamics and global collaboration patterns in well-being and social innovation fields of research.

Findings. The following subparagraphs present the main results of the analysis.

Main Statistics.

The analysis thoroughly examines the relationship between the literature on well-being and social innovation covering ten years from 2015 to 2024. The study focuses on a sample of 175 documents developed by 515 researchers with a citation average of 19.10 and published in 125 journals. The articles reveal that authors' engagement in international co-authorships equals 26.29% and that publications on well-being and social innovation show an annual growth rate of 20.68%. More specifically, considering the scientific yearly production (Figure 1), we can notice a positive trend with an all-time high in 2024. Such a positive trend suggests the increasing interest of researchers in studying the topic and, accordingly, its relevance to the academic community. The significant fluctuations between specific years, such as the drop between 2018 and 2020 and between 2022 and 2023, could reflect changes in interest and potential influences from external factors that may have impacted scientific production.

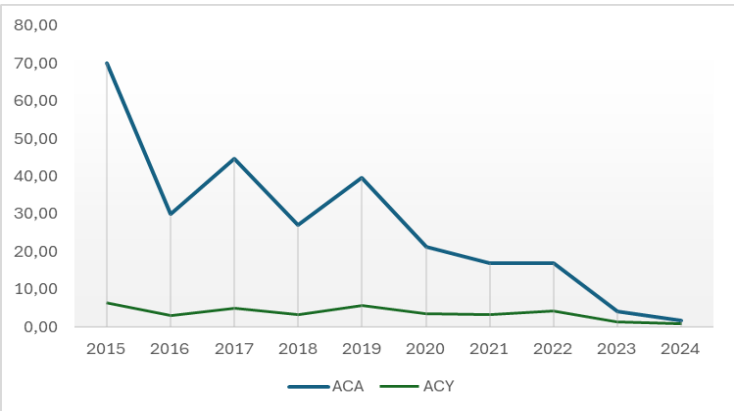
Fig. 1: Annual Scientific Production



Source: authors' elaboration on Biblioshiny's analysis

Considering the citations of articles, Figure 2 illustrates the "Average Citations Per Article" (ACA) and the "Average Citations Per Year" (ACY) indicators over time. The ACA started at a very high value in 2015, averaging approximately 70 citations per article. After 2015, it shows a steady decline, with occasional fluctuations that never come close to the initial peak. From 2019 onward, the average stabilises at approximately 10-20 citations per article before experiencing a sharp drop starting in 2021-2022 and continuing through 2024. In contrast, the ACY indicator remains consistently lower than the ACA, staying below 10 throughout the entire period. It exhibits a slight rise from 2015 to 2020, stabilising at low levels (approximately 2-5 citations per year) before further declining in 2023-2024.

Fig. 2: ACY and ACA indicators



Source: authors' elaboration on Biblioshiny's analysis

Most relevant sources and documents

Focusing on the 125 sources in which the articles on the relationship of well-being and social innovation were published, they encompass academic disciplines such as business and management, social sciences, economics,

econometrics and finance, arts and humanities and psychology. The most relevant ones are depicted in Table 1. Considering the total citation number (TC), the Sustainability (Switzerland) journal dominates with 396 citations and 14 papers (NP), followed by the Journal of the Knowledge Economy (330) and the Ecosystem Services Journal (330).

Tab. 1: Most relevant Sources

Source	TC	NP	PY_start
Sustainability (Switzerland)	396	14	2019
Journal of the Knowledge Economy	330	3	2022
Ecosystem Services	330	1	2015
International Journal of Sustainability in Higher Education	237	1	2019
Journal of Rural Studies	181	5	2019
Forest Policy and Economics	177	6	2018
Research Policy	145	1	2017
Technological Forecasting and Social Change	97	2	2017
European Planning Studies	96	1	2018
IEEE Transactions on Engineering Management	78	1	2021

Source: extrapolated from Biblioshiny's analysis

The TC index in Table 2 indicates the impact of the most globally cited articles on the relationship between well-being and social innovation. In particular, the articles by Carayannis and Morawska-Jancelewicz (2022), Purcell et al. (2019), and Carayannis et al. (2021) emphasise that universities and platforms such as living labs can act as catalysts for social and digital innovation, improving the quality of life through co-creation with different stakeholders and the adoption of innovative technologies, emphasising that the goal of social innovation is well-being. In contrast, articles by McPhearson et al. (2015) and Eichler and Schwarz (2019) focus on social innovation in urban settings and explore the link between well-being and social innovation through the integration of ecosystem services and collaborative solutions to address sustainability challenges, demonstrating that participatory green spaces and multifunctional infrastructure can improve people's physical, mental and social well-being. In parallel, Richter (2019) and Dax and Fischer (2018) focus on the rural context, highlighting how social innovation can adapt to the needs of local communities, improving social capital and addressing issues such as demographic decline through participatory initiatives that enhance resilience and quality of life. Vickers et al. (2017) analysed hybrid organisations that provide health and well-being services in England and provided a theoretical framework for understanding how innovation in public services emerges from the fluid and creative interaction between multiple institutional logics. Finally, while Rahman et al. (2017) explore the impact of financial instruments in improving the economic and social inclusion of marginalised communities in Bangladesh, Cattivelli and Rusciano (2020) demonstrate how self-organised initiatives during the Covid-19 pandemic helped to respond to the challenges of the food crisis, promoting social cohesion and well-being. In summary, all these studies underline that by adopting sustainable, collaborative and inclusive approaches, social innovation improves the well-being of individuals and communities and addresses complex challenges by adapting to the specificities of each context.

Tab. 2: Most Global Cited Documents

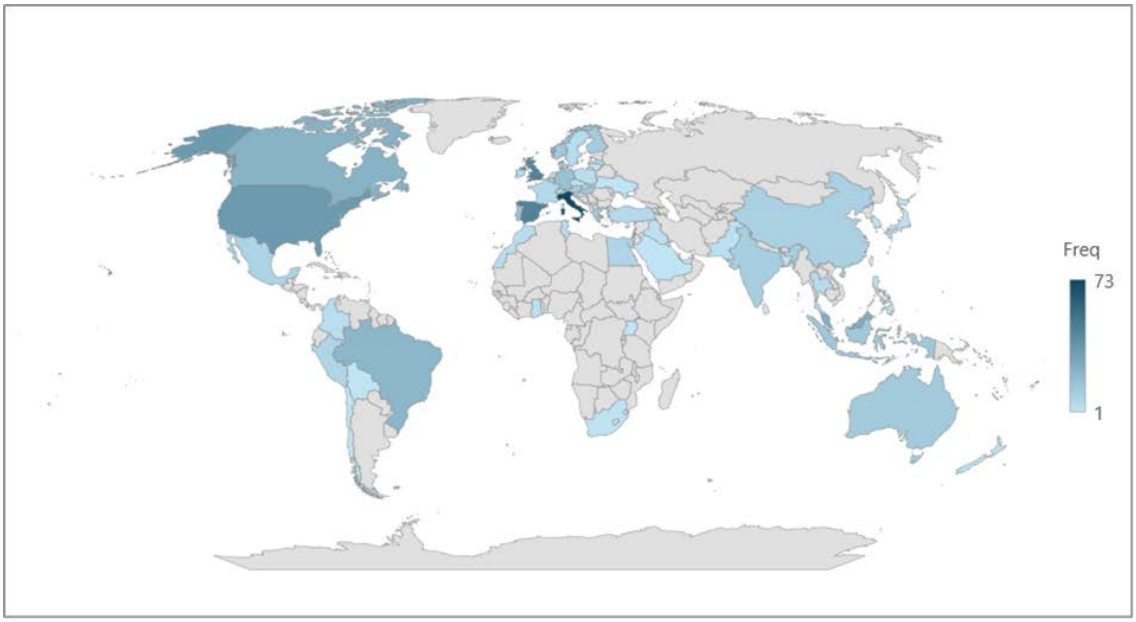
Paper	Journal	Total citations (TC)	Tc per year	Normalised TC
McPhearson et al. (2015)	Ecosyst Serv	330	30	4,71
Carayannis and Morawska-Jancelewicz (2022)	J Knowl Econ	250	62,5	14,74
Purcell et al. (2019)	Int J Sustain High Educ	237	33,86	5,97
Vickers et al. (2017)	Res Policy	145	16,11	3,25
Eichler and Schwarz (2019)	Sustainability	140	20	3,53
Richter (2019)	J Rural Stud	122	17,43	3,07
Dax and Fischer (2018)	Eur Plann Stud	96	12	3,54
Rahman et al. (2017)	Technol Forecast Soc Change	95	10,56	2,13
Cattivelli and Rusciano (2020)	Sustainability	81	13,5	3,79
Carayannis et al. (2021)	IEEE Trans Eng Manage	78	15,6	4,64

Source: adapted from Biblioshiny's analysis

Most productive countries

Considering the most productive countries in terms of contribution to the well-being and social innovation literature, Figure 3 shows those with the highest impact, as they demonstrated a consistent contribution in terms of publications in this field of research.

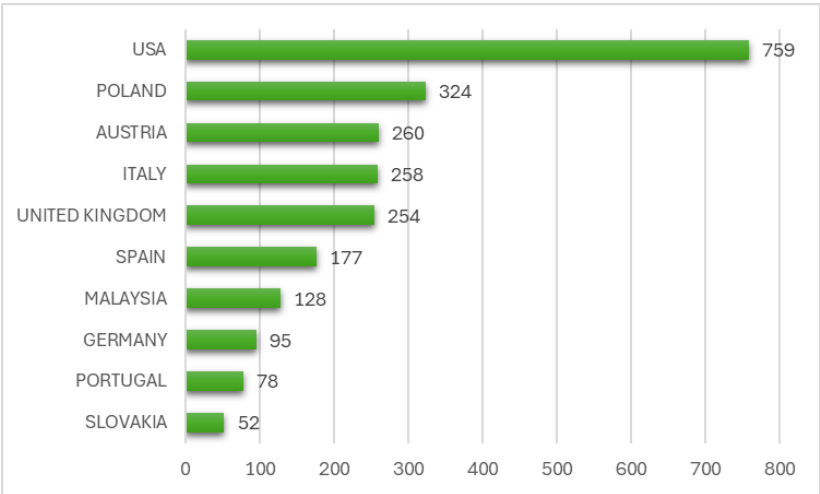
Fig. 3: Countries' Scientific Production



Source: extrapolated from Biblioshiny's analysis

More in detail, Figure 4 indicates the most cited countries - meaning the number of citations received by academic articles according to the author's country of origin, showing a clear predominance of the United States of America (USA) with 759 citations, indicative of significant high-impact academic production. Europe, Poland (324), Austria (260), Italy (258) and the United Kingdom (254) are at the top, reflecting a substantial contribution from European countries in this field of research. Moreover, Spain (177), Germany (95) and Portugal (78) are in an intermediate range, demonstrating a consistent level of scientific production with international impact. Concerning Asia, Malaysia (128) emerges as the most cited Asian country, a sign of the growing contribution of research from this region. Overall, the distribution shows a strong correlation between academic resources, research infrastructure and global scientific impact, with the increasing internationalisation of scholarly research, as evidenced by the significant contribution of non-Western regions.

Fig. 4: Most Cited Countries

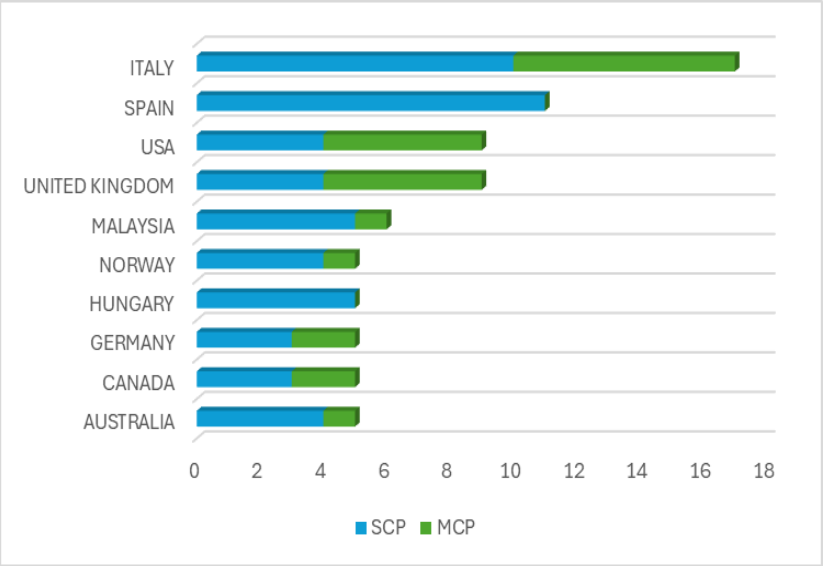


Source: authors' elaboration on Biblioshiny's analysis

Furthermore, focusing on collaborations among authors, Figure 5 shows the distribution of academic publications classified according to their geographical origin and type of collaboration, distinguishing between SCP (Single Country Publications) and MCP (Multiple Country Publications). The graph highlights the strong correlation between international collaborations and overall academic productivity, with some countries balancing both types (such as Spain and the United Kingdom) and others favouring a more focused mode (such as Malaysia and Hungary). In particular, Italy stands out as the country with the highest overall number of publications, both for SCP and MCP, with an evident prevalence of publications produced in collaboration with other countries (MCP), indicating an academic production

resulting from partnerships with other countries and an active commitment to global integration and cooperation in the field of research. Spain shows a balance between national and international publications, followed by the UK and the USA, which show significant numbers but in a more balanced proportion between SCPs and MCPs, suggesting active participation both nationally and internationally. Conversely, Malaysia, Norway and Hungary emphasise in-country collaborations (SCPs) in contrast to Germany, Canada and Australia, which show a higher propensity for international cooperation than exclusively national publications.

Fig. 5: Most relevant countries by corresponding authors

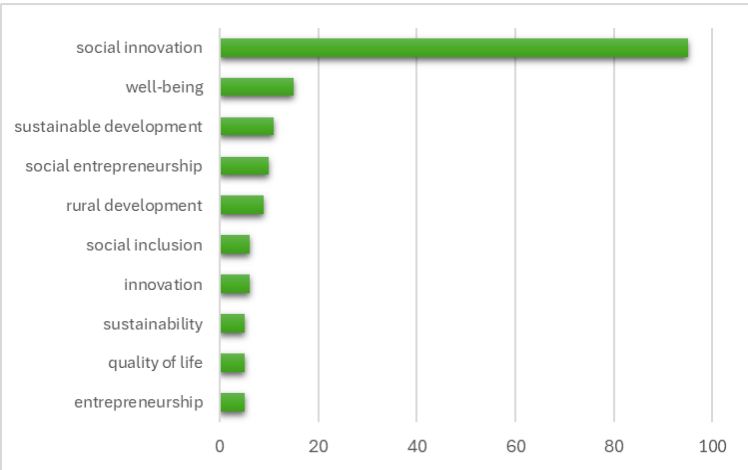


Source: authors' elaboration on Biblioshiny's analysis

Keywords and Topics Trend

The graph in Figure 6 shows the distribution of the most frequently used keywords within the examined documents, sorting them according to frequency. The graph highlights the wealth of research on social innovation and the links between it and other topics, such as welfare and sustainability. In particular, the term 'social innovation' is the most recurrent word, indicative of being the key or transversal theme in the narrative. The term ' well-being', placed immediately after, demonstrates the close relationship between the theme of social innovation and the improvement of well-being, be it of an individual or a community. Equal in occurrence are the terms 'sustainable development' and 'social entrepreneurship', which reflect the researcher's strong focus on sustainable development and the role of social entrepreneurship in promoting innovative solutions to social challenges. In addition, words such as 'rural development', 'innovation' and 'social inclusion' indicate the development of analysis in specific contexts, such as rural areas mentioned in several papers and about key values such as social inclusion. Further terms such as 'entrepreneurship', 'quality of life' and 'sustainability' emphasise issues related to quality of life, the role of entrepreneurship and sustainability.

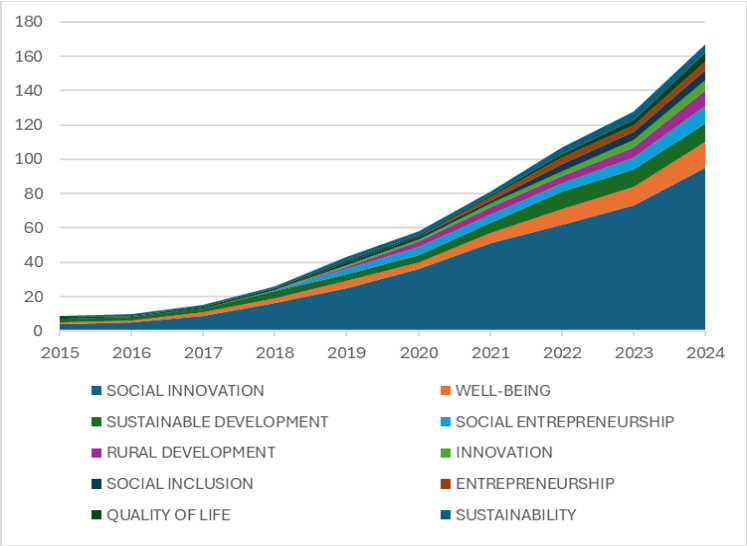
Fig. 6: Most Frequent Word



Source: authors' elaboration on Biblioshiny's analysis

As for the cumulative trend of occurrences of these terms over 2015-2024, the graph in Figure 7 reflects the growing importance of social innovation as a transformational driver to address global challenges. The centrality of the term 'social innovation' is supported by the parallel interest in well-being, sustainable development, and social inclusion issues, highlighting a research landscape evolving towards interdisciplinary and high social impact solutions.

Fig. 7: Words' Frequency over Time

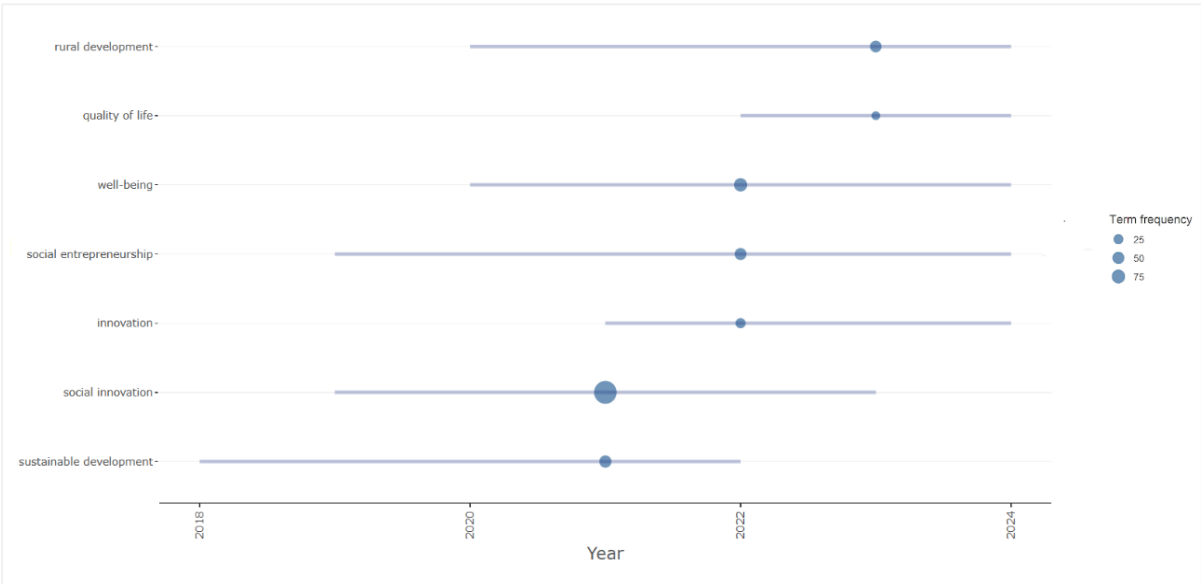


Source: elaboration on Biblioshiny's data analysis

Evolution of trends topic over time

Figure 8 explains trending topic dynamics by presenting the most cited articles and showing how their relevance has evolved. The chart illustrates the temporal trends of the most significant terms in the analysed corpus, highlighting the periods during which these terms were most discussed. Larger circles indicate peaks in frequency during specific years, suggesting greater attention toward those terms at those times. It is evident that the main terms, such as "social innovation," "well-being," and "sustainable development," show a consistent presence but with peaks of attention in specific years — for example, "social innovation" peaks in 2022, "well-being" in 2023, and "sustainable development" between 2022 and 2023. Additionally, the themes of "well-being" and "quality of life" gain more relevance toward the end of the analysed period, suggesting that these are emerging topics. As for social entrepreneurship, researchers' interest appears to be concentrated more in the middle of the analysed period, with active research activity between 2020 and 2022.

Fig. 8: Trend topics



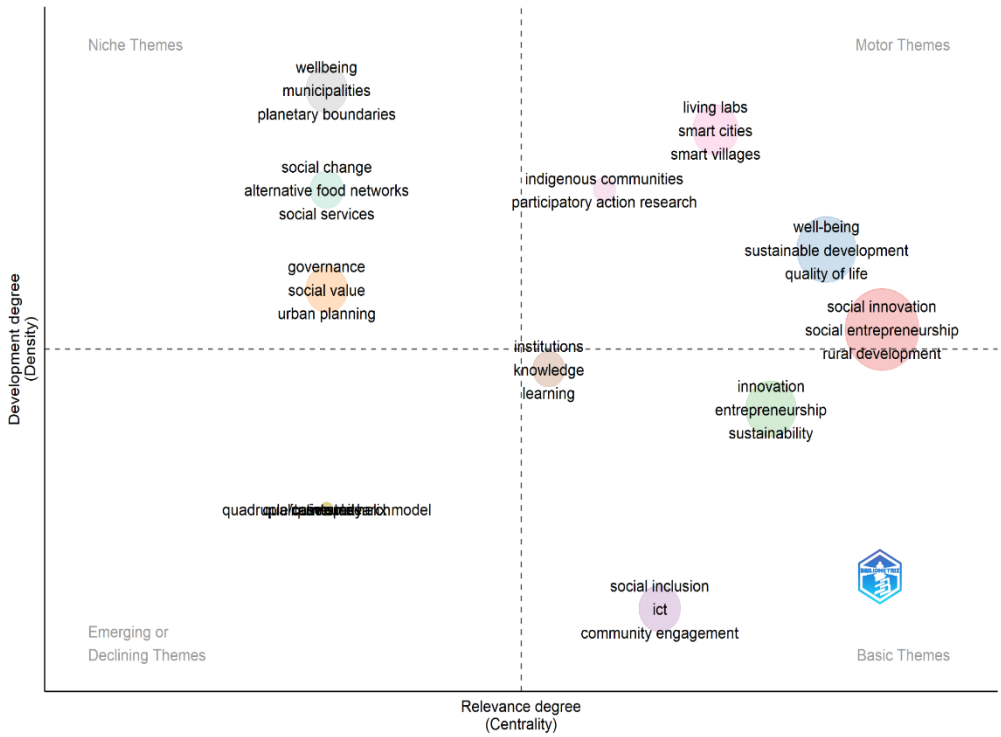
Source: adapted from Biblioshiny's analysis

Conceptual thematic map

The thematic map was used to analyse and visualise the main themes within the corpus of scientific articles identified (Figure 9). It was constructed using Louvain's algorithm, making it possible to create a hierarchical structure that helps study the main themes (macro-clusters) and the sub-themes. Such a map is based on two main dimensions: the degree of centrality (relevance), which indicates how well the theme is connected to other themes in the network, and the degree of development (density), which measures the internal cohesion of the theme. The map's area is divided into four quadrants: at the top right are the 'motor themes', which include core concepts such as well-being, sustainable development and social innovation that are high centrality and density themes. They are well-developed and fundamental to the corpus, representing key academic and operational interest areas in the research context. At the top left are the 'niche themes', which include urban planning and governance topics that are highly specific and in-depth but weakly connected to other core topics, suggesting research opportunities to explore their intersection with main topics. On the bottom left, the 'emerging or declining themes' are placed, such as quadruple helix approaches representing marginal topics that may emerge as future trends or are gradually losing relevance. Finally, in the lower right-hand corner, we have the 'basic themes', such as social inclusion and community engagement, with high significance and often linked to other themes but less explored in-depth. They are fundamental to understanding the context and offer room for further study. Overall, this analysis allows us to identify consolidated areas and new research directions, highlighting the conceptual structure of the field studied and its theoretical and applicative evolution.

Moreover, it is possible to identify the role and temporal dynamics of the leading research topics by integrating the information deriving from the Trend Topics graph (Figure 8) and the Thematic Map (Figure 9). Motor themes emerge in the trend topics graph with increasing frequency in 2022-2024, confirming their centrality in contemporary literature. In particular, social innovation with a dominating frequency represents a conceptually and practically key topic. Well-being and quality of life follow a similar trend, highlighting their nature as central and established themes. Shifting the focus to the basic themes, they do not appear with particularly significant frequencies in the trend topics graph, confirming that although central, they lack depth over time and require further research. Moreover, in the trend topics graph, the niche themes are of little interest in recent years, as they are probably confined to particular research areas. Finally, the quadruple helix approach identified in the quadrant of "emerging or declining themes" does not appear in the trend topics graph, indicating, as per the significance of the thematic map, that it may be a topic still being defined or of declining interest in relation to the literature under study.

Fig. 9: Thematic Map



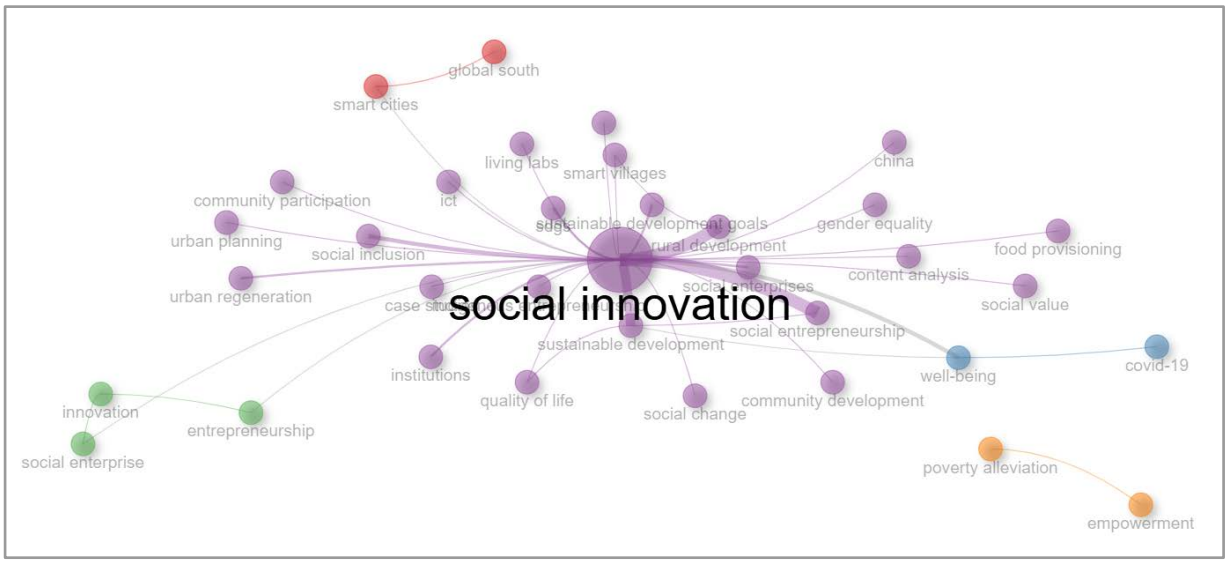
Source: Biblioshiny's data analysis

Co-occurrence of keywords

The co-occurrence graph represents a conceptual network visualising the links between the most frequently used terms in the analysed literature. The clusters identified in the co-occurrence of keywords analysis in Figure 10 are the following five. Cluster 1 - Social innovation and global issues (purple), is the largest, including 26 nodes, with social innovation at its centre. It serves as the network's core and represents the connection between social innovation and global challenges, such as environmental sustainability, gender equality, and rural development.

Cluster 2 - well-being and social impacts (blue) includes nodes such as well-being and encompassing themes related to health, quality of life, and the social impact of global events such as the pandemic. It highlights the central role of well-being in discussions on social innovation (Vázquez-Maguirre, 2020; de Carvalho and Oliveira-Melo, 2024; Bona et al., 2024). Cluster 3 - urban and geographic innovation (red) includes nodes such as smart cities (Cortés-Cediel et al., 2021; Smith et al., 2023) and global south (Calzada, 2023) and focuses on concepts related to smart cities, their role as hubs of innovation, and the importance of geographic context in the application of social innovation. Cluster 4 - entrepreneurship and innovation (green) contains nodes such as innovation, entrepreneurship, and social enterprise, representing concepts related to the promotion of innovative entrepreneurial initiatives to foster social change (Cole and Hagen, 2024; Caro-González, 2023; Maguirre et al., 2016). This cluster plays a key role in exploring technological and entrepreneurial innovation within the context of social innovation. Cluster 5 - poverty and empowerment (orange) includes nodes such as poverty alleviation and empowerment. Despite its small size, it represents significant themes related to improving living conditions and promoting individual and community autonomy (Robby et al., 2023; Huang et al., 2020).

Fig. 10: Co-occurrence of keywords



Source: Biblioshiny's data analysis

Implications. *This study - still in progress - shows important implications that deepen understanding of the relationship between social innovation and well-being. On the one hand, the analysis contributes to the theoretical debate by offering an integrated framework linking fragmented literature and providing a structured overview of existing literature, identifying key themes and emerging trends. On the other hand, the results show the transformative potential of social innovation in several contexts, such as urban, rural, technological and academic. More in detail, the centrality of social innovation in addressing global challenges like environmental sustainability, gender equality, and rural development emphasises the need for interdisciplinary strategies to enhance well-being. Measuring its impact within global contexts and adopting reliable methodologies and context-related tools are essential to understanding the link between social innovation and well-being improvements, ensuring the relationship's consistency. Moreover, social innovation processes should prioritise improving people's lives by considering tailored well-being solutions to specific communities, supporting their resilience. Increasingly, the success of social innovation for well-being relies on understanding geographic context, particularly within the disruptive impact of smart cities. Social enterprises and technological innovations should address sustainable social change by developing customised strategies recognising the uniqueness of cultural factors of each geographic context while leveraging entrepreneurs' innovative capacity to lead impactful solutions. Finally, to alleviate poverty, social innovation must enable empowerment to actively build individual and community autonomy, fostering sustainable living conditions and long-term self-sufficiency. Such results demonstrate the positive change social innovation initiatives can generate, such as inclusive practices, strengthening community resilience, and supporting sustainable development. Therefore, businesses, policymakers and non-profit organisations could capitalise on the findings of these scientific studies and adopt innovative, cross-sectoral strategies that holistically address environmental and social challenges and promote social cohesion and long-term well-being.*

Limitations. *At the current state, the analysis shows also some limits. Indeed, relying only on the Scopus database may have excluded relevant studies potentially narrowing the scope of the review. In addition, focusing on a specific period (2015-2024) might have offered a view on recent developments in the relationship between social innovation and well-being.*

Originality of the article. *The paper offers an integrated and up-to-date perspective about the relationship between social innovation and well-being, by filling a critical gap in the literature. It is the point of departure to explain how social innovation can be strategically leveraged to promote well-being at both individual and community levels, effectively responding to contemporary social challenges.*

Keywords: *social innovation; well-being; social inclusion; sustainable development; bibliometric analysis*

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A systematic literature review on drivers and barriers for supply chain decarbonization

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Abstract

Climate change presents a major disruption to natural ecosystems and a critical challenge for both the global community and academic research. In response, achieving net-zero supply chains has become a key priority within Sustainable Supply Chain Management (SSCM). While prior studies have proposed conceptual frameworks to integrate sustainability into supply chains, many lack a solid theoretical foundation. Thus, scholars have highlighted the need for theory-driven research to deepen understanding in this area.

This paper addresses this gap by conducting a systematic literature review focused exclusively on organizational and managerial theory-grounded studies. The research identifies the key drivers and barriers that influence supply chain decarbonization strategies. A multi-level perspective is employed to analyze how these forces operate across institutional, supply chain, and firm-level domains.

The study offers both theoretical and managerial contributions. It enhances the field of Green Supply Chain Management (GSCM) by systematically mapping factors shaping decarbonization through a rigorous theoretical lens. From a managerial standpoint, it delivers insights to help practitioners develop strategies for the net-zero transition.

Framing of the research. *In recent decades, the transition to net-zero supply chains has gained increasing attention in sustainable supply chain management (SSCM) research (Ghadge et al., 2020; Vimal et al., 2022; L. Xu et al., 2023; Hettler & Graf-Vlachy, 2024). Foundational studies by Seuring & Müller (2008) and Carter & Rogers (2008) established conceptual frameworks for integrating sustainability across supply chains. Subsequent research has examined low-carbon supply chains (Shaharudin et al., 2019), cultural influences on carbon-neutral capabilities (Ambekar et al., 2019) and challenges in building resilient net-zero supply chains (Vimal et al., 2022).*

While these contributions provide valuable insights, many lack a strong theoretical foundation, prompting calls for theory-driven research in this context (Sarkis et al., 2011; Allen et al., 2021; Seuring et al., 2022). Some scholars have sought to address this gap. Daddi et al. (2018) explored the application of organizational theories in climate change studies, while Kannan (2021) reviewed theoretical approaches in sustainable procurement. Similarly, Todaro et al. (2020) examined theories in environmental management systems, and Govindan et al. (2024) analyzed theoretical trends in SSCM.

The application of management theories is essential for framing and explaining complex phenomena in SSCM, given the field's multi-stakeholder nature, multi-level analyses (product, company, supply chain), and intersection of environmental, economic, and social dimensions (Govindan et al., 2024). Additionally, Mishra et al. (2022) identified a critical research gap, highlighting both the need for supply chains-focused studies in the context of the net-zero transition and theory-driven research.

Purpose of the paper. *Our study aims to understand the factors that influence supply chain decarbonization strategies, ensuring scientific rigor by including only studies grounded in recognized management and organizational theories. By adopting a systematic literature review (SLR) approach, we address the need for theory-driven research in the field of supply chain decarbonization. To this end, we pose the following research question:*

RQ: What are the main drivers and barriers that influence the development of a carbon-neutral strategy at the supply chain level?

The main contributions are twofold. First, it advances theoretical understanding of supply chain decarbonization by systematically mapping the factors shaping this transition through a rigorous theoretical lens. Second, it offers practical contributions by providing science-based insights to support practitioners in developing strategies that effectively take into consideration all the relevant factors and mechanism influencing climate change mitigation strategies at the supply chain level.

Methodology. *This study employs a SLR approach to ensure methodological rigor and minimize researcher bias in the inclusion and exclusion of studies. Following Pittaway et al. (2004) and Rousseau et al. (2008), the SLR approach*

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offers a high level of transparency, allowing for replicability and clear communication of the review process. Moreover, this methodology is particularly suited for synthesizing evidence across a diverse body of literature (Crowther & Cook, 2007). The review was conducted in line with the guidelines proposed by Tranfield et al. (2003).

Data collection. The data collection process was iterative, involving the identification of relevant sources through the application of carefully selected keywords. The datasets consulted were Scopus and ISI Web of Science, two widely recognized databases that provide comprehensive and reliable results (Harzing & Alakangas, 2016; Liao et al., 2017). The query was designed to capture studies related to climate change mitigation at the supply chain level, with a focus on contributions to organizational and management theories. The search algorithm employed was: ("climate change" OR "net zero" OR "carbon neutral" OR "decarbon*") AND (“supply chain*" OR “value chain*” OR SSCM OR SCM OR “scope 3) in titles, abstract and keywords. This broad query ensured the inclusion of diverse yet relevant studies, reducing the risk of excluding pertinent literature. Denyer & Tranfield (2009) emphasize the importance of a broad spectrum of studies in an SLR to mitigate researcher value judgments and threats to validity. To ensure the quality of the included studies, only articles published in journals listed in the AJG (formerly ABS) 2024 rankings were selected. Knowing that this choice reduces the inclusiveness and breadth of the review, we decided to include only higher-impact journals as they contain state-of-the-art research and set the future agenda (Keupp et al., 2012; Savino et al., 2017), thereby ensuring coverage of dominant themes and debates. Following Williams et al. (2024), we selected the AJG list due to its broad interdisciplinary focus. The list provides a quality ranking of sustainability-focused journals and includes wide range of journals, stretching across fields that are either central or salient to business and management studies.*

The research domain was restricted to articles categorized under business, management, economics, social and environmental sciences, and econometrics. Additionally, the selection was limited to peer-reviewed journal articles and review articles written in English, with no restrictions on the time span. The initial query was executed in September 2023 and updated in November 2024, yielding 724 papers from Scopus and 773 from ISI Web of Science. After removing duplicates, 1,033 unique articles remained for further analysis.

Tab. 1: Summary of SLR criteria

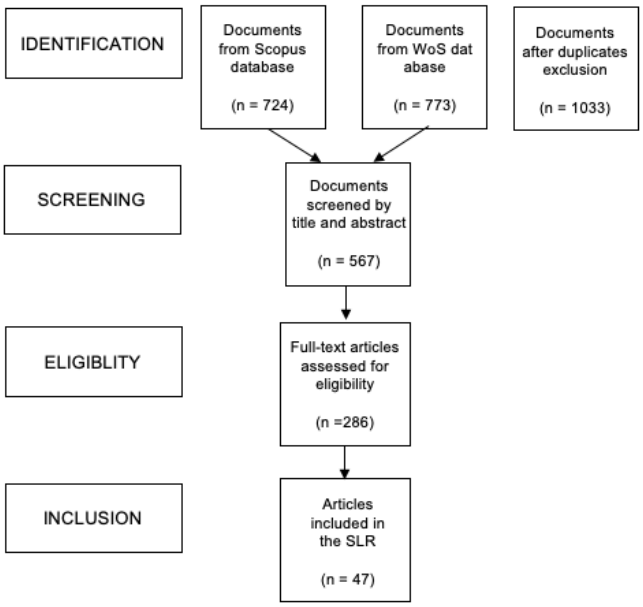
Database	Scopus; Web of Science
Time period	None selected*
Search fields	Title, Author, Keywords
Search keywords	("climate change" OR "net zero" OR "carbon neutral*" OR "decarbon*") AND (“supply chain*" OR “value chain*” OR SSCM OR SCM OR “scope 3)
Research domain	Scopus: Business, Management and Accounting; Social Sciences; Economics, Econometrics and Finance; Environmental Science Web of Science: Environmental Sciences Ecology; Business Economics; Operations Research Management Science
Publication Title	Only AJG (former ABS) listed journals
Document type	Article or Review Article
Language	English

Data extraction and synthesis. In the data extraction and synthesis stage, a structured framework for data analysis was developed, along with the identification of key research themes (Rousseau et al., 2008). This stage involved screening abstracts to identify relevant literature and establish clear inclusion and exclusion criteria. Studies were excluded if they lacked a management or organizational theory in their theoretical background, did not analyze the supply chain as the unit of analysis, adopted a broader sustainability perspective unrelated to climate change mitigation, or applied macroeconomic rather than managerial approaches. In the first phase, titles and abstracts were screened, resulting in the retention of 567 documents, while 180 studies were excluded for not meeting the inclusion criteria.

The second phase involved a full-text assessment of 286 papers, systematically coding the sample for the presence of organizational and management theories. The Excel software facilitated systematic categorization and filtering. The classification was based on established frameworks (Defee et al., 2010; Sarkis et al., 2011; Chicksand et al., 2012; Touboulic & Walker, 2015; Daddi et al., 2018; Todaro et al., 2020; Del Gesso & Lodhi, 2024), identifying 30 organizational and management theories.

The eligibility phase resulted in a final dataset of 47 papers.

Fig 1: Screening process



Results. *A thematic analysis was conducted adopting a qualitative approach to identify and examine the main drivers and barriers against climate change mitigation strategies within SCM. The analysis is grounded in established organizational management theories, ensuring both theoretical rigor and relevance. The entire process was facilitated using Excel software, which enabled systematic categorization, filtering, and evaluation of the critical variables and concepts.*

The following sections will provide a deeper understanding of the main drivers and barriers to supply chain decarbonization. These forces are grouped in three main categories encompassing the different domains in which they emerge, including the broad institutional context, the supply chain level, and the firm level.

Drivers

We conceptualize drivers are internal or external pressures that necessitate or motivate change within an organization. They create a sense of urgency, compelling organizations to initiate change to maintain competitiveness or compliance (Fig 1).

At the institutional level, regulatory, governmental and legal frameworks play a key role in driving supply chain decarbonization (Kolk & Pinkse, 2004; Cristina De Stefano et al., 2016; Furlan Matos Alves et al., 2017; Liu et al., 2020; Linares-Rodriguez et al., 2022; Harahap et al., 2023; Deng et al., 2024; Dohale et al., 2024). However, Oyewo et al. (2024) argue that high-quality policy formulation and implementation - characterizing effective governance - do not necessarily lead to carbon reduction unless it addresses properly scope 3 emissions.

Market dynamics also serve as institutional drivers. Consumer preferences, market capacity, and green trust encourage firms to adopt decarbonization strategies (Zu et al., 2018; Niu et al., 2022; Zhou et al., 2023). Competitive pressures (Deng et al., 2024), environmental crises (Touboulic et al., 2018), and the pursuit of environmental legitimacy (Deng et al., 2024) further reinforce decarbonization efforts. Additionally, shareholders and stakeholders exert influence, particularly through salience (Kolk & Pinkse, 2004) and legitimacy (Block et al., 2024).

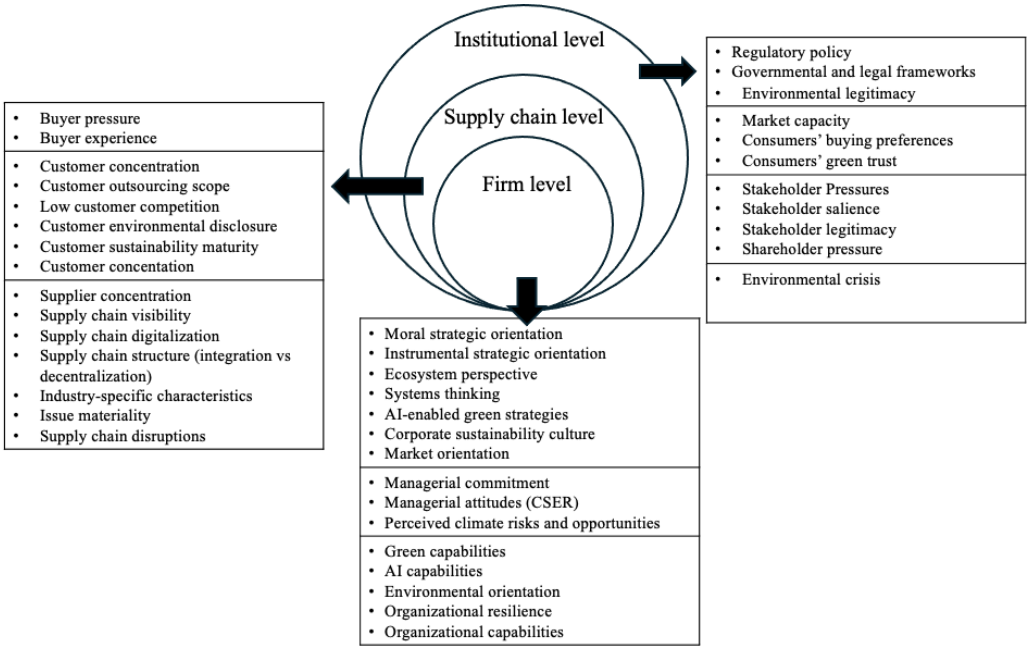
At the supply chain level, buyer and customer-related pressures significantly impact decarbonization. Buyers exerting strong pressure or that have experience can drive suppliers toward carbon reduction (Damert & Baumgartner, 2018; Eggert & Hartmann, 2021). Customer-related drivers include customer concentration (Xu et al., 2024), customer outsourcing scope (Liu et al., 2020), low customer competition and customer-base environmental disclosure (Song et al., 2024). Downstream customer characteristics, such as customer concentration, sustainability maturity, and shifts in power as a result of sustainability-related maturity also influence the transition (Theien et al., 2014; Xu et al., 2024). Similarly, supplier concentration fosters supply chain decarbonization (Xu et al., 2024). Structural and contingency factors within the supply chain also drive change. Supply chain visibility and digitalization act as indirect driver (Balci & Ali, 2024; Li et al., 2025), while supply chain integration presents mixed findings: some studies indicate internal and external integration as a driver (Balci & Ali, 2024; Javed et al., 2024), whereas Chen & Wang (2017) argue that decentralized structures better support emissions reduction. Industry-specific characteristics, issue materiality and supply chain disruptions also emerge as drivers (Eggert & Hartmann, 2021; Kolk & Pinkse, 2007; Furlan Matos Alves et al., 2017).

At the firm level, several strategic and managerial factors drive decarbonization efforts. Lintukangas et al. (2023) distinguish firms with moral motives, integrating climate change into corporate strategy and influencing public policy,

from firms with instrumental motives, which prioritize emissions reduction due to sectoral GHG intensity and reputational concerns. Moreover, the adoption of an ecosystem perspective and systems thinking facilitates carbon neutrality (Man et al., 2024; Papadonikolaki & Anumba, 2024), while AI-enabled green business strategies significantly accelerate this transition (Chotia et al., 2024). Managerial commitment and corporate culture play a critical role, as do managers' attitudes toward corporate social and environmental responsibility (Damert et al., 2018). These authors show that also perceived climate-related risks and opportunities influence firms' proactive engagement in decarbonization.

Finally, a growing body of literature highlights organizational capabilities as key drivers of supply chain decarbonization. Studies identify green capabilities, environmental orientation, AI capabilities, market orientation, resilience, and broader organizational capabilities as enablers of carbon neutrality (Akter et al., 2024; Block et al., 2024; Man et al., 2024; Song et al., 2024). These capabilities enhance firms' ability to navigate regulatory challenges, develop innovative low-carbon solutions, and integrate decarbonization into long-term business strategy.

Fig 1. Drivers towards supply-chain decarbonization across the institutional, supply-chain and firm level.



Barriers

In our conceptualization, encompass the challenges, uncertainties, and opposing forces that hinder or prevent supply chains from achieving decarbonization goals (Fig 2).

At the institutional level, economic and market-related barriers significantly obstruct the transition to carbon neutrality. Uncertainty in the returns of decarbonization investments, and energy market volatility create financial risks that discourage action (Miklautsch & Woschank, 2022; Niu et al., 2022). Additionally, Harahap et al. (2023) identified other institutional barriers in infrastructure constraints, carbon lock-in, carbon leakage and low consumer willingness to pay for certain low-carbon products, such as sustainable fuels. Similarly, resource constraints, including limited access to renewable energy sources, negatively impact scope 3 decarbonization efforts (Sharma et al., 2024).

Regulatory challenges also emerge as critical barriers. Regulatory uncertainty, policy variability among different regions, lack of standardization, and absence of regulatory incentives weaken firms' commitment to decarbonization (Cristina De Stefano et al., 2016; Damert & Baumgartner, 2018). At the social level, resistance from established regimes and societal opposition slow progress (Harahap et al., 2023; Man et al., 2024). Additionally, information asymmetry among stakeholders hinders coordination and decision-making, particularly for scope 3 emissions (Niu et al., 2022). Finally, leveraging on system's theory, Papadonikolaki & Anumba, (2024) investigated the impact of joint complexity stemming from policy-related, social and technical forces - analyzing the interaction between data complexity and software system together with human and organizational factors.

At the supply chain level, structural factors pose significant barriers. Vertical and spatial complexity, limited visibility, fragmentation, and underdeveloped green supply chain networks limit firms' ability to coordinate decarbonization efforts (De Stefano & Montes-Sancho, 2024; Li et al., 2025; Sharma et al., 2024). Resource constraints and limited access to critical raw materials represent a contingent constraint (Furlan Matos Alves et al., 2017). Additionally, supply chain carbon uncertainty creates risk-averse decision-making, delaying decarbonization pathways (Belhadi et al., 2024).

Relational barriers also play a crucial role. Conflicting goals among supply chain partners, difficulties in finding win-win solutions and the misalignment of sustainability priorities challenge collaborative decarbonization efforts (Chen

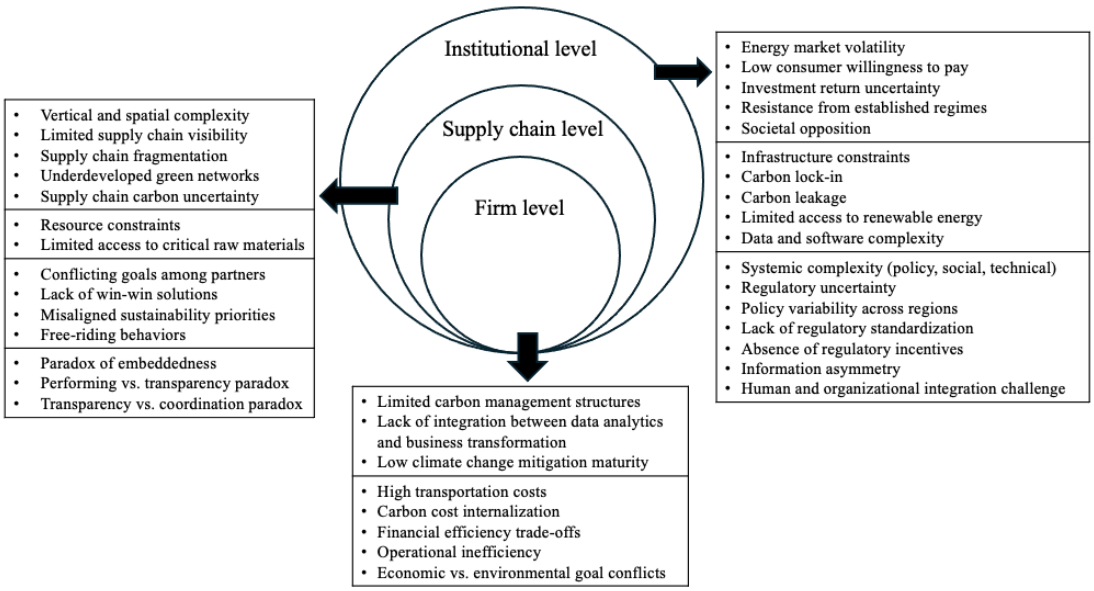
& Wang, 2017; Miklautsch & Woschank, 2022). Man et al. (2024) conceptualize this misalignment of goals as an interoperability challenge, where stakeholders operate under conflicting sustainability schemas. Furthermore, free-riding behaviors undermine collective efforts, as some firms benefit from sustainability initiatives without actively contributing (Kang & Tan, 2023).

Drawing on paradox theory, the paradox of embeddedness has been identified as another key barrier (Dahlmann et al., 2023). This paradox arises at the intersection of the performing paradox - where firms struggle between sustainability transparency and performance improvements - and the organizing paradox, where supply chain transparency conflicts with coordination efforts. These tensions complicate firms' ability to implement effective carbon reduction strategies.

At the firm level, organizational constraints hinder decarbonization efforts. Limited carbon management structures and lack of integration between data analytics and business transformation slow progress (Furlan Matos Alves et al., 2017; Belhadi et al., 2024). Firms in the early stages of climate change mitigation management face additional obstacles in establishing robust decarbonization strategies (Chiappetta Jabbour et al., 2015; Li et al., 2025).

Economic and financial constraints also emerge as major barriers. High transportation costs and internalization of carbon-related costs add financial burdens (Miklautsch & Woschank, 2022), while achieving financial and operational efficiency remains challenging (Sharma et al., 2024). Trade-offs between economic and environmental goals further complicate firms' ability to commit fully to decarbonization strategies (Mahapatra et al., 2021).

Fig 2. Barriers against supply-chain decarbonization across the institutional, supply-chain and firm level.



Research limitations. *This study is grounded in a rigorous and robust sample, including only AJG-listed journal articles explicitly referring to management theories as their theoretical background. This methodological choice ensures credibility and alignment with established research standards. However, few criticalities can be identified.*

The first limitation of this study, as it remains a work in progress, is the absence of a structured framework for the interpretation and visualization of drivers and barriers. While the analysis identifies and categorizes these factors, their integration into a cohesive framework is yet to be developed. This limitation also extends to the theoretical dimension of the study. Although the sample includes only articles that explicitly reference management theories, the current version does not establish a direct connection between these theories and the identified drivers and barriers.

Managerial implications. *This study provides valuable insights for practitioners navigating the decarbonization of entire supply chains, offering evidence-based guidance grounded in high-rigor academic research. By synthesizing findings from AJG-listed journal articles, it delivers a comprehensive perspective on the factors influencing the net-zero transition.*

Specifically, the study outlines both internal and external drivers that initiate and shape change, alongside barriers that generate uncertainty or threaten transition success. This holistic understanding equips supply chain managers with a structured view of the dynamics at play, enabling them to design strategies that align with the complexity and scale of the challenge. Recognizing the interplay between these factors allows firms to anticipate risks and mitigate barriers, ultimately enhancing the feasibility and resilience of supply chain decarbonization efforts.

Originality of the paper. *This study provides valuable original contributions both from a practical and theoretical perspective. Beyond the managerial insights outlined in the previous section, its theoretical originality lies in advancing*

the field of Green Supply Chain Management (GSCM) by offering new evidence on the factors shaping supply chain decarbonization.

To the best of the authors' knowledge, no prior literature review has systematically structured the state of the art on supply chain decarbonization strategies with a rigorous theoretical approach. This study uniquely builds on recognized management and organizational theories, ensuring a theory-driven examination of the topic. Furthermore, it comprehensively maps drivers and barriers - capturing both forces that stimulate and facilitate supply chains toward carbon neutrality and those that hinder this transition. Unlike existing studies, it adopts a multi-level perspective, analyzing how these factors operate across different domains: the institutional environment, the supply chain and the single firm levels. By integrating these dimensions, this research advances theoretical understanding and provides a solid foundation for future studies on the role of management theories in guiding supply chain decarbonization.

Key words: *Climate change mitigation; Supply Chain Decarbonization; Literature Review; Management theories; Drivers; Barriers*

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Decoding the Twin Transition: Integrating Theory and Practice in Digital and Sustainable Transformation

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Abstract

The intersection of digital transformation and sustainability, known as the "twin transition", is gaining importance in management but remains theoretically and practically fragmented. This paper presents a systematic literature review (SLR) following PRISMA guidelines to synthesize current knowledge on this dual challenge. The review shows growing interest in using digital technologies (such as AI, IoT, and blockchain) to drive sustainability across sectors like agrifood, supply chains, and smart cities, with research in this area growing at 18.56% annually. However, most studies address digitalization and sustainability separately, lacking an integrated framework. Key themes, including technology-sustainability synergies, stakeholder collaboration, and hybrid skills, are identified but remain underexplored. Significant gaps include fragmented perspectives and limited empirical evidence. This study outlines future research directions and proposes a management-oriented framework to strengthen both theory and practice. It offers an original synthesis of the twin transition and calls for a holistic approach to align digital innovation with sustainability, enhancing competitiveness and socio-environmental impact.

Framing of the research. *In both academia and management practice, digital and sustainable transitions are increasingly recognized as highly significant (Plekhanov et al., 2023; Gillani et al., 2024; Ernst et al., 2016; Almeida et al., 2017). Recent studies emphasize process digitization, the use of enabling technologies, and their effects on enterprises and external stakeholders (Lim et al., 2020; Dhar et al., 2022). Meanwhile, sustainability has motivated numerous investigations into reducing environmental impact, promoting green innovation, and examining corporate roles in global challenges like climate change (Saunila et al., 2018; Van Loon et al., 2021). However, growing contextual complexity and converging international policies underscore the limitations of siloed approaches. Attention is increasingly focusing on a "twin transformation/transition" that merges digital and sustainable dimensions (Montresor & Vezzani, 2023; Tabares et al., 2025). This integrated perspective reveals synergies between technological innovation and sustainable development, promoting new business models that fuse competitiveness, resource efficiency, and socio-environmental responsibility (Schiederig et al., 2012; Song et al., 2019). This twin transition is now a key strategic priority for European institutions, significantly influenced by public policies (European Commission, 2020a, 2020b, 2021, 2022; OECD, 2019). According to the Digital Economy and Society Index (DESI), only 56% of European small and medium-sized enterprises have a basic level of digital intensity. Meanwhile, the urgency to lower greenhouse gas emissions and foster a circular economy has intensified (European Commission, 2019). Consequently, substantial funds (e.g., through the Next Generation EU plan) are dedicated to supporting investments in projects that further both digital and sustainable goals (European Commission, 2022). Despite policymakers' strong interest and significant resource allocation, management literature often treats digital transformation and sustainability practices separately. Consequently, integrated analyses of these dimensions remain scarce (Gao, 2024). Numerous studies investigate advanced technology adoption and its influence on business activities and value creation (Vial, 2021; Feliciano-Cestero et al., 2023), recognizing that digitization fundamentally reshapes business models, organizational processes, role structures, and value chains (Ritter & Pedersen, 2020). However, they frequently focus on performance outcomes and the strategic, technological, or organizational implications, neglecting other crucial considerations (Caputo et al., 2021). Conversely, research on sustainable development and green innovation has examined how environmental, social, and governance (ESG) principles can be embedded in corporate strategies (Bansal, 2005; Schaltegger et al., 2016). These principles increasingly relate to efficiency gains, enhanced reputation, and new market prospects (Yang et al., 2024). Approaches that integrate economic, social, and environmental objectives are crucial to understanding long-term value creation (Ghobakhloo et al., 2021), particularly in resource-intensive sectors where economic-environmental tensions can be more acute (Bansal, 2005). Consequently, sustainability-focused research emphasizes technological solutions that reduce emissions and encourage circular consumption and production patterns (Geissdoerfer et al., 2017). Digital technologies can diminish waste and optimize production flows, while environmental aims guide the circular redesign of products and services (Rehman et al., 2023). Therefore, digital and sustainable dimensions are deeply intertwined, as digital tools*

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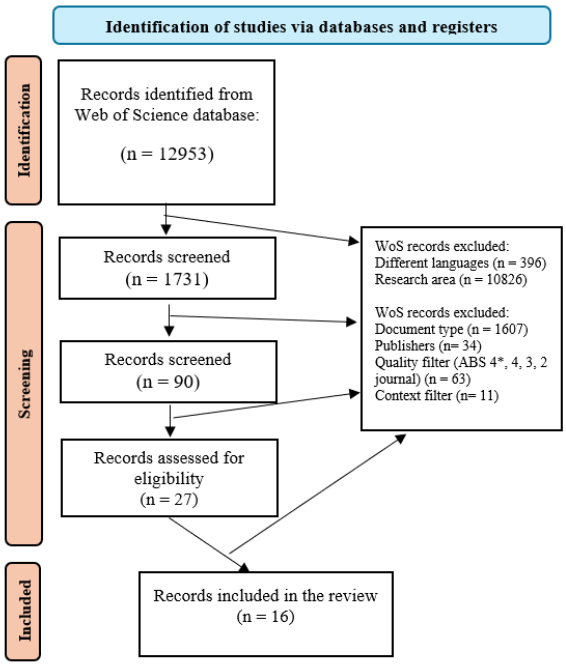
boost the efficacy of green initiatives, while sustainability principles guide responsible implementation (Abbate et al., 2023; Tabares et al., 2025). Limiting technology analyses to specific industries (e.g., manufacturing or logistics) without considering broader environmental and social implications is no longer adequate (Faggian et al., 2024). A focus on the twin transitions is needed to capture the diverse elements of innovation, governance, and socioeconomic impact that emerge from jointly applying digital solutions and sustainable practices (Montresor & Vezzani, 2023; Rehman et al., 2023). In a networked landscape, the simultaneous adoption of digital systems and sustainability initiatives by many stakeholders, both internal and external, demands integrated evaluation (Montresor & Vezzani, 2023; Christmann et al., 2024; Trevisan et al., 2024). This combined approach not only fosters competitiveness but also accelerates decarbonization and curbs environmental damage (European Commission, 2019; Rehman et al., 2023).

Purpose of the paper. *Despite the magnitude and relevance of the digital and sustainable transition, research in management literature on the convergence of these two elements (the so-called "twin" transition) remains underdeveloped. A strong, shared theoretical framework is needed to clarify how both research and practice can effectively address this dual challenge. Such a framework would position digitalization not merely as a supportive tool, but as a driver of sustainability, while ensuring that sustainability imperatives also inspire new forms of digital innovation. This gap in the literature, alongside the fragmented knowledge on the subject, underscores the need for a comprehensive systematic review. Such a review should illuminate the dynamics among the various research streams that converge on this topic and emphasize the importance of conceptualizing it through a management-oriented lens. To address this gap, the present paper conducts a systematic review of the most influential literature reviews on the subject, with the aim of (a) examining existing synthesized knowledge, (b) mapping the current state of the art, (c) identifying key concepts, and (d) suggesting future research directions to advance the field.*

Methodology. *According to Kraus et al. (2022), a SLR represents a rigorous and relevant approach that produces knowledge, helps to identify trends and research paths as well as potential future developments. In order to understand the phenomenon under analysis, a focus was provided exclusively on literature reviews on the topic. To select the useful and relevant ones, a set of keywords was established to compose a search query that could be used in the Web of Science (WoS) database. This approach may prove useful in ensuring that the articles covered are more complete, so that the analyses do not omit relevant information (Lim et al., 2022). The query used to search for the most relevant and inherent works on the topic was formulated taking into account the various nuances that this topic takes on; in fact, a first part takes into consideration the digital element ('digital transform*' OR 'digital transition*' OR digitalization OR ICT) followed by the element of sustainability (sustainab* OR 'green transform*' OR 'green transition*' OR 'ecological transition' OR 'eco-transition' OR 'eco transform*') and finally we look directly for the terms used in the definition of the topic of interest ('twin transform*' OR 'twin transition*' OR 'dual transform*' OR 'dual transition*'). In order to develop the analysis of the theoretical framework, the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009) were followed (Figure 1), presented below.*

Fig. 1: PRISMA Diagram



The search covers the period from 2021 until March 2025, a time period dictated by the chosen papers and not imposed by the authors. In addition, the search was refined by applying the following inclusion criteria: categories (Business, Management); language (English); publisher excluded (MDPI); source type (review); filter on journal quality

(e.g. '4', '4', '3', '2'); and contextual filter (field-relevant papers). No time interval was specified, which led to the inclusion of a total of 16 articles in the final analysis (Table 1 contains details of all articles examined in the study).*

Results. *We began with a descriptive analysis to clarify the quantitative composition of the research and to gauge its impact in terms of citations. From 2021 to 2024, interest in the twin transition has grown within the scientific community, yet the literature remains comparatively limited when measured against more established fields. Of the 16 selected papers, 9 different publication outlets were represented, demonstrating a degree of heterogeneity without excessive dispersion. Scientific collaboration appears to be prevalent. Each paper has an average of 3.81 co-authors, and 68.75% show international co-authorship, indicating a strong propensity for transnational research initiatives. The annual growth rate of 18.56% suggests that interest in this area is steadily increasing. While only a few relevant publications emerged in 2021, the number has gradually risen, stabilizing between 2022 and 2023 and reaching a peak in 2024. Although not exponential, this trend indicates the formation of a core set of studies that is likely to expand further as theoretical and practical insights into twin transformation become more established. The 16 collected articles show an average of 93.31 citations each, highlighting a notable degree of influence given that this is still an emerging research area. Their combined 2,098 bibliographic references attest to a broad conceptual scope ranging from sustainability to digitization, innovation, and strategy. While the literature remains in its early stages, interest in the twin transition is clearly on the rise, evidenced by numerous references pointing to cross-disciplinary approaches and potential integration. Table 1 summarizes the most relevant aspects of the content analysis and contributions of the selected reviews.*

Tab. 1: Selected reviews on the topic

Biblio graphic Reference	Study Type / Context	Digital Dimension	Sustainability Dimension	Twin Perspective	Key Results / Contributions	Gaps / Future Research	Cit
Rad et al. (2022) - Industrial Marketing Management	Review of 221 studies on Industry 4.0	Focus on 11 core technologies for supply chain	References to green supply chain	Not explicitly twin	Mapping benefits and challenges of Industry 4.0	Integration of technologies and deeper sustainability exploration	73
Dal Mas et al. (2023) - Technological Forecasting & Social Change	Literature review and business case analysis in agrifood	Blockchain for traceability and digitalization	Central in waste reduction and emission control	Partially descriptive	Systematic mapping of blockchain applications in agrifood	Governance, interoperability, synergy with other technologies	46
Guandalini (2022) - Journal of Business Research	SLR of 153 articles	Digital technologies as a transformation lever	Triple bottom line and SDGs	Clear twin framing	Thematic taxonomy and conceptual proposals	Multi-stakeholder empirical validation needed	118
Chauhan et al. (2022) - Technological Forecasting & Social Change	SLR on circular economy and digitalization	IoT, AI, and Big Data enabling circular practices	CE as model to minimize waste	Twin without strong framework	Key role of technologies in resource tracking	Cultural barriers and new skills required	282
Madanaguli et al. (2023) - Technological Forecasting & Social Change	Prospecting review on Industrial Digital Platforms	IDPs for value creation and co-creation	References to green servitization	Not explicitly twin	Unifying definition and model of IDP	Cross-sectoral studies and global adoption impacts	24
Madanaguli et al. (2024) - Technological Forecasting & Social Change	Scoping review on AI for circular business models (CBM)	AI for resource optimization and management	Support for CBM and overcoming barriers	Twin framing focused on AI	Four key AI capabilities for CBM	Empirical validation and collaborative governance needed	10
Sha et al. (2024) - Technological Forecasting & Social Change	SLR on urban governance and disruptive technologies	ICT, AI, and Big Data for smart cities	Urban inclusiveness and sustainability	Twin with social focus	City label model and adaptive governance	Quantitative studies and public-private collaboration	6
Di Vaio et al. (2021) - Journal of Business Research	SLR on digital innovation and knowledge management	Big Data, CRM, ERP for knowledge sharing	Long-term sustainable performance	Twin with social reference	Strengthening KMS and competitive models	Link between KMS and sustainability, management skills	253
Mora et al. (2023) - Technovation	SLR on smart city governance	IoT platforms, AI, and data analytics	Sustainability through collaborative governance	Integrated twin	Governance framework for smart cities	Empirical validation and privacy-inclusion balance	74
Di Vaio et al. (2024) - Journal of Enterprise Information Management	SLR on supply chain management (SCM)	AI, cloud, Big Data for supply chain accountability	Sustainable supply chain aligned with SDGs	Twin in SCM	Framework for resilience and sustainability in SCM	Sustainability KPIs and cultural factors	51
Esashika et al. (2020) - Technology Analysis & Strategic Management	SLR and meta-synthesis on smart cities	ICT infrastructure and data analytics	Smartness linked to sustainability	Twin in smart cities	Five key characteristics of smart cities	Common indicators validation and longitudinal studies	13
Ghobakhloo et al. (2021) - Business Strategy and the Environment	SLR and ISM on Industry 4.0 and green innovation	IoT, AI, cyber-physical systems	Development of sustainable innovations	Twin with strategic roadmap	11 key functions and roadmap	Validation of roadmap, focus on SMEs	191
Parmentola et al. (2021) - Business Strategy and the Environment	SLR on blockchain and sustainability	Blockchain for traceability and smart contracts	Environmental and sectoral sustainability	Twin environmental-sectoral	Blockchain for greener supply chains	Quantifying benefits and incentives for large-scale adoption	185
Rusch et al. (2022) - Business Strategy and the Environment	SLR on sustainable product management	IoT, AI, blockchain for LCA and reverse logistics	Circular life cycle and transparency	Twin in product management	Real-time data and eco-design	Interoperability standards and impact measurement	131
Trevisan & Formentini (2024) - IEEE Transactions on Engineering Management	SLR on food loss & waste	Blockchain, IoT, and sharing platforms	Waste reduction and food equity	Clear twin perspective in agrifood	Mapping technologies across food supply chain stages	Multi-actor governance and infrastructural barriers	21
Chopra et al. (2024) - Review of Managerial Science	Bibliometric review on digitalization and sustainability	AI, IoT, Big Data across sectors	Triple bottom line impacts	Interdisciplinary twin	Focus on efficiency and ethical governance	Social disparities and inclusive policy recommendations	15

This analysis confirms that the existing literature reflects a growing interest in integrating digital technologies (e.g., AI, Big Data, blockchain, IoT) and sustainable practices across multiple domains ranging from agrifood (Dal Mas et al., 2023; Trevisan & Formentini, 2024) to supply chains (Rad et al., 2022; Di Vaio et al., 2024), smart cities (Sha et al., 2024; Mora et al., 2023; Esashika et al., 2020), and business model innovation (Chauhan et al., 2022; Madanaguli et al., 2023, 2024). Various studies indicate that digital transformation can bolster sustainability by enhancing traceability, transparency, and waste reduction (Guandalini, 2022; Rusch et al., 2023; Parmentola et al., 2022), as well as by strengthening competitive advantage and fostering innovation (Di Vaio et al., 2021; Ghobakhloo et al., 2021).

Urban and inclusive governance perspectives (Mora et al., 2023; Sha et al., 2024) and stakeholder co-creation mechanisms (Esashika et al., 2020) also emerge as important factors, highlighting organizational barriers and skill gaps (Chopra et al., 2023). While numerous studies focus on either the digitalization dimension or sustainability, and some explicitly address a "twin" perspective (Guandalini, 2022; Madanaguli et al., 2024; Di Vaio et al., 2024), there remains a lack of a solid conceptual review and categorization that systematically situates twin transformation within the management domain. On the institutional side, the European Commission (2021) underscores this topic as a strategic pillar for future competitiveness. At the same time, classic contributions emphasize the necessity of addressing sustainability through an integrated approach, such as the triple bottom line (Elkington & Rowlands, 1999). Research on digitalization (Brennen & Kreiss, 2016) likewise affirms that simply adopting new technologies is insufficient without concurrently rethinking organizational models, processes, and competencies. Consequently, there is a pronounced need for a robust conceptual framework that not only describes the dynamics of twin transformation but also classifies its practices, challenges, and impacts from a managerial perspective.

Discussion. *The systematic review of the twin transition reveals a field brimming with potential yet marked by fragmentation and underdeveloped theoretical grounding. While the literature underscores the growing relevance of this dual paradigm, it also exposes critical gaps in understanding how these dimensions interact within managerial contexts. To advance the field, this section outlines five research trajectories that emerge from the review's findings, followed by a comprehensive research agenda designed to guide future scholarship and practice. These trajectories aim to bridge the siloed perspectives of digitalization and sustainability, fostering an integrated approach that resonates with the strategic imperatives of modern organizations.*

Research Trajectories

1. ***Unpacking Integration Mechanisms: How Digital Tools Drive Sustainable Outcomes***
   Digital technologies (AI, IoT, blockchain) can drive sustainability by improving resource tracking and reducing waste, but the mechanisms and trade-offs (e.g., energy use vs. e-waste) remain unclear. Future research should map synergies and tensions through detailed case studies or simulations, offering managers guidance for technology adoption.
2. ***Exploring Stakeholder Dynamics in Networked Ecosystems***
   Collaboration among firms, governments, and communities is crucial in networked ecosystems. However, power dynamics, incentives, and governance structures are not well understood. Future studies should examine coordination mechanisms using qualitative and quantitative methods to assess their impact on innovation and sustainability.
3. ***Building Organizational Capabilities for Dual Transformation***
   Organizations need hybrid competencies that blend digital and sustainability expertise. Research should focus on how firms restructure, train leaders, and foster cultures that support dual transformation, using case studies of companies leading in this space.
4. ***Developing Integrated Measurement Systems***
   Current metrics for digitalization and sustainability are siloed. There's a need for holistic indicators (e.g., carbon footprint of digital operations) and dynamic dashboards. Research should validate these KPIs through experimental studies in different organizational contexts.
5. ***Understanding Sectoral and Contextual Variations***
   The twin transition varies by industry and region. Comparative research should explore how factors like resource intensity, regulatory frameworks, and regional support influence adoption, identifying both universal strategies and sector-specific best practices.

Research Agenda. *In response to these gaps, a structured research agenda emerges along three overarching objectives: theoretical consolidation, empirical validation, and managerial operationalization. The agenda first advocates for a unifying conceptual framework that bridges digitalization and sustainability paradigms, providing a basis for studies on how specific technologies either amplify or constrain sustainable outcomes. Second, it calls for robust empirical investigations to validate how stakeholder configurations, leadership models, and cultural factors can shape organizations' ability to pursue dual transformation. Finally, it underscores the need to translate findings into integrated metrics and best practices, empowering managers to strategically align digital initiatives with environmental and social imperatives. Collectively, this agenda aims to overcome the field's current fragmentation, guiding scholars and practitioners toward a more coherent and impactful understanding of the twin transition.*

Tab. 2: Research Agenda for Advancing the Twin Transition in Management

Goal	***Objective***	***Agenda Items***	***Expected Outcome***
Theoretical Consolidation	*Develop a comprehensive framework integrating digitalization and sustainability*	*- Map digital technologies to sustainability outcomes (e.g., AI for circularity).* *- Theorize stakeholder ecosystems using governance models.* *- Define hybrid capabilities via a competency model (e.g., RBV extension).*	*A unified framework linking technology, stakeholders, and capabilities, guiding future research and practice.*
Empirical Validation	*Ground the framework in evidence across diverse settings*	*- Longitudinal case studies on integration mechanisms (e.g., agrifood, smart cities).* *- Surveys/network analysis of stakeholder dynamics.* *- Action research on hybrid capabilities.* *- Pilot integrated metrics.* *- Cross-sectoral/regional comparisons.*	*A validated framework with empirical support, enhancing its credibility and adaptability.*
Managerial Operationalization	*Equip managers with tools and strategies for implementation*	*- Develop technology selection guides.* *- Create governance templates for partnerships.* *- Design training for hybrid skills.* *- Prototype integrated dashboards.* *- Curate a sectoral/contextual playbook.*	*Practical resources (e.g., tools, playbooks) that operationalize the framework for managerial use.*

This research agenda not only addresses the embryonic state of twin transition literature (Gao, 2024) but also aligns with the strategic priorities of institutions like the European Commission (2021). By pursuing these trajectories, scholars can move beyond descriptive accounts of digital and sustainable practices toward a dynamic, management-oriented paradigm. For practitioners, the agenda offers a pathway to harness digitalization for sustainability-driven innovation (Adams et al., 2016), fostering competitiveness while tackling global challenges like climate change. As the field matures, these efforts will cultivate a shared language and toolkit, enabling organizations to navigate the complexities of the twin transition with confidence and purpose.

Research limitations. *This systematic approach primarily relies on high-quality articles from the Web of Science database, ensuring strong, reputable sources. However, this focus may overlook valuable contributions from other formats, such as institutional reports, working papers, and conference proceedings. As a result, the findings reflect the most recognized research but may miss additional perspectives that could enrich understanding, especially in a relatively new and fragmented field. Expanding the search to other scientific databases, like Scopus, could help address this limitation.*

Managerial implications. *Not applicable as the paper is conceptual and based on a literature review.*

Originality of the paper. *This paper aims to systematize knowledge on the concept of twin transformation within the management field, thereby addressing a fragmented body of literature that often tackles digitalization and sustainability through largely sector-specific or technological lenses. Consequently, it fills a gap by proposing an overarching framework that interlinks diverse analytical perspectives and offers a systematic categorization of the principal theoretical and practical research strands.*

Key words: *Twin transition; Digitalization; Sustainability; Transformation.*

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Choose Sustainable! How Digital Nudging positively impacts consumer behavior and corporate reputation

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Abstract

Digital nudging has recently gained relevance across multiple domains; however, its effectiveness in fostering sustainable consumer behaviour remains underexplored. This study is part of ongoing research on digital nudging for sustainability and contributes to a broader research project on conscious shopping. This study builds upon previous research that identified three predominant digital nudging architectures and aims to empirically test their effectiveness in promoting conscious shopping. Employing a between-groups experimental design and a structured online questionnaire, the results confirm the efficacy of all three proposed architectures in driving sustainable consumption. The study found that the crowd-sourcing model was the most effective in increasing engagement, while the in-sourcing model had the strongest effect on consumers' willingness to pay a premium price for sustainable products. The study also emphasized the crucial role of retailers in fostering consumer trust and credibility through digital nudging strategies. While prior research has examined digital nudging for sustainability, this is the first empirical study to evaluate the effectiveness of dominant nudging architectures within the realm of conscious shopping.

Framing of the research. *Sustainability has become a defining challenge of the 21st (Schaefer & Crane, 2005). Originally conceptualized as the scarcity of natural resources (Kuhlman & Farrington, 2010), sustainability now encompasses three interrelated pillars: environmental, social, and economic (Purvis et al., 2018). Although the relevance of sustainability has become one of the main goals pursued by the United Nations with the design of the Sustainable Development Goals (SDGs) (Whittimgham et al., 2023), the efforts made to achieve these goals are insufficient (United Nations, 2023) with substantial gaps remaining between sustainability commitments and actual progress. As Sheth et al. (2011) have emphasized, the responsible behaviour of individuals is a pivotal driver of sustainable development.*

Consumer behaviour is of crucial importance in achieving sustainability targets; nevertheless, research indicates that despite consumers seeking companies that align with their values and expressing concern for sustainability (Anuradha et al., 2023), their purchasing habits do not always reflect these intentions. This discrepancy between intention and action can be attributed to various factors, including the reluctance of consumers to adopt more sustainable choices, particularly when these choices involve higher costs or compromises in product performance (Olson, 2013). This paradox presents an opportunity for behavioural interventions such as nudging to bridge the gap between sustainable intentions and actions. Consequently, companies have adopted marketing strategies (Anuradha et al., 2023) that effectively encourage consumers to make sustainable choices. In this regard, the promotion of sustainable behaviours has emerged as a primary domain for the application of nudging and digital nudging (Bergram et al., 2022).

Nudging, as defined by Thaler and Sunstein (2008), refers to the implementation of subtle interventions that influence behaviour in a predictable way without restricting choices or significantly altering economic incentives. This concept is rooted in the idea that 95 percent of daily decisions are not entirely rational (Bargh et al., 2001; Caraban et al., 2019) but are instead shaped by heuristics and cognitive shortcuts that simplify decision-making by reducing cognitive effort (Shah & Oppenheimer, 2018; Caraban et al., 2019). By leveraging these cognitive tendencies, nudging can effectively guide individuals towards socially beneficial behaviours, including those that support sustainability (Mont et al., 2014; Lehner et al., 2016).

The application of nudging in the context of sustainability is a growing field of research, as evidenced by the increasing volume of literature on the subject (see Mont et al., 2014; Lehner et al., 2016; Trewern et al., 2021; Mirbabaie et al., 2022). The utilisation of nudges has garnered increased attention as a promising strategy to encourage sustainable societal behaviours. Despite the presence of certain limitations, the efficacy of nudges appears to exceed that of conventional marketing methodologies (Gonçalves et al., 2021).

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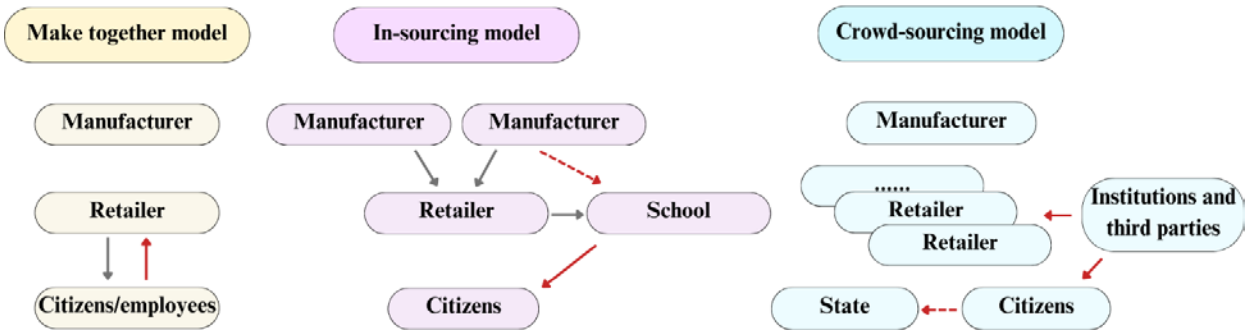
Digital nudging is a concept that has been expanded into the online sphere, leveraging the increasing presence of digital touchpoints in decision-making (Weinmann et al., 2016; Mirsch et al., 2018; Jesse & Jannach, 2021; Mele et al., 2021). In comparison to physical environments, digital nudging offers a cost-effective, scalable, and personalised approach to influencing consumer behaviour, enabling real-time monitoring and behavioural analysis (Schneider et al., 2018). While it has demonstrated potential in shaping consumer decisions, its effectiveness remains largely unexplored (Henkel et al., 2019; Auf der Landwehr et al., 2021), particularly in the context of sustainability (Stieglitz et al., 2023).

Pellegrini et al. (2022) identified three distinct digital nudging architectures, each differing in the level of consumer involvement. The first, "Make Together", represents a collaborative effort between the retailer and the consumer, where purchasing decisions contribute directly to a sustainability initiative. For example, a retailer may choose to donate 1% of sales to an environmental cause when consumers purchase a specific product (e.g., "If you buy this product, we donate 1% of sales to an environmental initiative"). The second, "In-Sourcing", requires more active participation from consumers, as the retailer organizes and communicates a sustainability initiative through a digital call-to-action, but individuals must take action to benefit from it. An example of this approach is a loyalty program that rewards customers with points for donating to a green initiative (e.g., "Earn loyalty points for donating to a green initiative"). The third, "Crowd-Sourcing", fosters collective consumer engagement in sustainable actions, encouraging participation in community-driven or group efforts. A common example of this is a bottle return programme, in which consumers collectively contribute to a recycling initiative (e.g., "Return used bottles to support a community recycling program"). The three architectures differ in their psychological mechanisms and engagement levels, and it is therefore crucial to empirically test their effectiveness in driving sustainable shopping behaviours.

Fig. 1: Digital nudging architectures by Pellegrini et al. (2022)



Source: Authors' elaboration

Objective of the paper. *The present study is part of ongoing research on digital nudging for sustainability and contributes to a broader research project on conscious shopping The objective of the present study is to empirically assess the effectiveness of the three digital nudging architectures proposed by Pellegrini et al. (2022) in influencing consumer decision-making within the context of sustainability. By applying these architectures to the context of conscious shopping, the research seeks to determine which is most effective in fostering sustainable behaviours. The study will specifically focus on the persuasive impact of the message conveyed, potential purchase intentions, consumer engagement, and the role of retailers in promoting sustainability. The study will also explore how decision-making may change based on the presence of specific stimuli and examine how these interventions shape consumers' perceptions of retailers as sustainability ambassadors. Specifically, this study investigates:*

RQ1: How do different sustainability message presentations influence consumer attitudes and behaviors?
RQ2: Can digital nudging strategies effectively increase consumer willingness to purchase sustainable products and pay a price premium?
RQ3: What role do retailers play in enhancing consumer trust and credibility through digital nudging?
RQ4: Which of the three digital nudging architectures is most effective in fostering sustainable consumption?

By addressing these questions, this research contributes to the broader discussion on behavioural marketing and sustainable consumption, providing actionable insights for both academia and practitioners.

Methodology. *In order to explore the effectiveness of the three digital nudging architectures in supporting conscious shopping and consumption, a between-group experimental study was conducted using an online structured questionnaire administered to 195 participants. This method was consistent with previous research (Adelaar et al., 2003; Sharma et al., 2010; Mohan et al., 2013; Bellini and Aiolfi, 2019; Aiolfi, 2023), which has found both techniques to be effective in understanding the stimuli that generate responses in consumers' perceptions and attitudes toward marketing communications. The administration of the questionnaire was conducted online, a medium deemed suitable for consumers who frequently engage with the Internet as it is likely to align with their familiarity with digital communications (Aiolfi, 2023). The experimental design entailed the presentation of a singular treatment to each participant, based on their last name initial, which was assigned to them according to the group they belonged to (Charness et al., 2012). Participants*

were randomly assigned to one of three groups, each exposed to a different digital nudging stimulus (Make Together, In-Sourcing, or Crowd-Sourcing). Each group, with a total of 65 participants per group, was presented with a unique visible stimulus referring to one of the three digital nudging architectures. As demonstrated in Figure 2, the three communications have been designed for the implementation of digital nudging for conscious consumption by an Italian retailer. The aim of this initiative is to communicate to its potential customers a sustainable initiative to benefit the environment and society. Specifically, each group was exposed to a standardized marketing message featuring the same graphics, slogan, and visual layout, with only the call-to-action differing depending on the target architecture and the resulting level of customer engagement required (see Table 1).

Fig. 2: Experimental stimuli

Source: authors' elaboration

Tab. 1: Call to action and customer engagement

	Make together	**In-sourcing**	**Crowd-sourcing**
Call to Action	Buy this product: 1% of sales proceeds will be donated to the "BEST Together" association	Buy this product: the loyalty points accumulated will be donated to the association "BEST Together"	Buy this product: returning the empty bottle to the supermarket will support the "BEST Together" association.
Responsibility	The consumer buys and the retailer donates	The consumer buys and donates	The consumer buys and has to return to the supermarket
Level of customer engagement required	Low	Medium	High

Source: authors' elaboration

Following their exposure to the communication, participants were invited to respond to a series of questions designed to evaluate the effectiveness of the communication and the impact of digital nudging techniques. These responses were collected by prompting participants to imagine that the initiative had been proposed by a trusted retailer. The questionnaire encompassed a range of domains, including the perceived usefulness and relevance of the promoted initiative, attitudes towards the advertising message, perceptions of compulsion and persuasion, intention to purchase sustainable products, willingness to pay a premium price, and the retailer's role in credibility, trust, and charitable contributions in sustainable initiatives through digital nudging mechanisms. Key variables assessed in the survey included perceived usefulness, relevance of the initiative, attitudes toward the advertising, Sense of constraint and persuasion, intention to purchase sustainable products, willingness to pay a premium price, corporate charitable contribution, credibility of the retailer and trust in the retailer. The measurement of these variables was conducted employing Likert scales adapted from validated literature (White et al., 2016; Netemeyer et al., 2004). Specifically, 5-point Likert scales were tailored to the digital nudging context and translated into Italian to enhance participant comprehension, as detailed in Table 2. Prior to the analysis of differences between the three groups, the data reliability was assessed using Cronbach's alpha, with all values exceeding the minimum acceptable threshold of 0.70 (Santos, 1999), thus confirming the internal consistency of the scales. Finally, in order to gain a comprehensive understanding of the distinctions among the three types of digital nudging architecture, a comparative analysis was conducted using analysis of variance (ANOVA). The study examined the three groups - make together, in-sourcing, and crowd-sourcing - by performing ANOVA tests with IBM SPSS 25.0 statistical software, ensuring statistical rigor in evaluating consumer responses across the different architectures (Bellini & Aiolfi, 2020).

Tab. 2: Scales summary

Variables	N. Item	Cronbach's Alpha	Mean
Perceived usefulness (adapted from Altsech, 1996) 1. The advertising message is perceived as credible. 2. The advertising message provides relevant information. 3. The advertising message effectively conveys the benefits of the initiative. 4. The advertising message provides a positive image of the initiative. 5. The advertising message provides practical information.	5	.88	2.81
Relevance of the initiative (adapted from Chen et al., 2016) 1. The initiative promoted by the supermarket is of great significance. 2. The initiative is consistent with my concerns about the environment. 3. The initiative responds well to my needs. 4. The initiative is important to me.	4	.91	3.26
Attitudes toward the advertising message (adapted from Cleveland et al., 2005) 1. After seeing this advertisement I will talk about the initiative with my family and friends 2. Seeing this advertisement makes me think that what it promotes is important 3. Seeing this advertising message makes me more willing to devote my time to the initiative 4. Seeing this advertising message, I feel like being an active part of the initiative 5. Seeing this advertising message makes me want to devote money to the initiative	5	.91	2.60
Sense of constraint and persuasion (adapted from Chang, 2017) 1. When faced with the message, it was difficult not to be persuaded by what it communicated 2. While viewing the advertisement, I had difficulty finding arguments against the proposed initiative 3. I was easily influenced by the advertisement for the initiative	3	.81	2.64
Intention to purchase sustainable products (adapted from White et al., 2016) Referring to the initiative proposed by the supermarket, indicate how much you agree with the following statements. 1. Very unlikely to buy/very likely to buy 2. I am not at all willing to buy / I am very willing to buy 3. I am not at all inclined to buy / I am very inclined to buy	3	.91	2.97
Willingness to pay a premium price (adapted from Netemeyer et al., 2004) 1. I am willing to pay a higher price for a sustainable product 2. I am willing to pay much more for a sustainable product	2	.73	2.77
Corporate charitable contribution (adapted from Hildebrand et al., 2017) The initiative promoted by the retailer: 1. Requires effort on the part of the retailer 2. It is charitable 3. It is human 4. It is sincere 5. It is useful	5	.88	3.40
Credibility of the retailer (adapted from Gupta, 2009) 1. The retailer seems reliable to me 2. I think the retailer will also be reliable in the future 3. I think the retailer keeps its promises 4. I think the supermarket is open to interacting with me 5. I think the supermarket is transparent	5	.94	2.96
Trust in the retailer (adapted from Darke et al., 2016) 1. I think I can trust the retailer 2. I think I can rely on this supermarket 3. I think I can trust the supermarket to do what it says it will do 4. The supermarket has a high level of moral integrity	4	.95	3.01

Source: authors' elaboration

Results. *The sample is composed of 66.7% women and 30.3% men, with the majority of respondents (55.4%) belonging to the Millennial generation (see Table 3).*

Tab. 3: Characteristics of the sample

	Features	Percentages			
		Overall sample	In-sourcing	Make together	Crowd-sourcing
Gender	Men	30.3	21.5	38.5	30.8
	Women	66.7	75.4	58.5	66.2
	Not stated	3.1	3.1	3.1	3.1
Age	Under 25	55.4	60.0	44.6	61.5
	26 - 40	33.8	27.7	41.5	32.3
	41 - 60	9.7	12.3	10.8	6.2
	61 - 79	1.0	-	3.1	-
	Over 80	-	-	-	-
Education	Secondary school	2.1	3.1	-	3.1
	Diploma	13.3	9.2	23.1	7.7
	Bachelor's degree	41.5	43.1	32.3	49.2
	Master's Degree	40.5	40.0	44.6	36.9
	Other	2.6	4.6	-	3.1

Source: authors' elaboration

The analysis demonstrates that participants, no matter the target group, hold a favourable attitude towards the proposed sustainable initiatives. Specifically, the three proposed initiatives were found to be useful and relevant, with values at or above the average. Individuals exposed to sustainable nudges experience a sense of constraints and persuasion, though on average these values are not excessively high.This indicates that nudges enable free and thoughtful choice by empowering individuals to make an informed decision. These perceptions influence subjects' propensity to join the initiative (RQ1). Analyses indicate a relatively high intention to participate in the initiative by purchasing sustainable products. However, the values of willingness to pay a premium price for the sustainable product promoted through the three architectures are lower (RQ2). The present study investigated the role of retailers in promoting digital push mechanisms for sustainability (RQ3). The results reveal that individuals place high levels of credibility and trust in retailers in relation to the three architectures, showing that retailers act as guarantors of the authenticity of what is promised. Similarly, the variable with the highest values, regardless of the proposed architecture, is the level of appreciation by customers about a company's charitable commitments. It is therefore suggested that a company's proactive and sustainable commitment to charitable causes can positively impact its corporate image, which in turn can influence consumer behaviour in a positive manner.

Tab. 4: ANOVA Test

Variables for each group		*Mean*	*SD*	*SE*	*ANOVA*
Perceived usefulness	Make together	2.588	.945	.117	Test of homogeneity of variance: Levene F(2, 192)=.037 (Mr. .963); ANOVA test: F=2.774 (Mr. .065) - no significant difference observed between groups
	In-sourcing	2.975	1.012	.126	
	Crowd-sourcing	2.877	.969	.120	
Relevance of the initiative	Make together	3.108	1.027	.127	Test of homogeneity of variance: Levene F(2, 192)=.617 (Mr. .540); ANOVA test: F=3.166 (Mr. .044); Post Hoc HSD Tukey: In-sourcing < Crowd-sourcing (mean difference=-.4039; Mr.<.05)
	In-sourcing	3.165	.992	.123	
	Crowd-sourcing	3.512	.948	.118	
Attitude toward the advertising message	Make together	2.505	.925	.115	Test of homogeneity of variance: Levene F(2, 192)=.903 (Mr. .407); ANOVA test: F=1.085 (Mr. .340) - no significant difference observed between groups
	In-sourcing	2.560	.962	.119	
	Crowd-sourcing	2.748	1.065	.132	
Sense of constraint and persuasion	Make together	2.682	.978	.121	Test of homogeneity of variance: Levene F(2, 192)=.165 (Mr. .848); ANOVA test: F=.605 (Mr. .547) - no significant difference observed between groups
	In-sourcing	2.523	1.036	.128	
	Crowd-sourcing	2.703	1.042	.129	
Intention to purchase sustainable products	Make together	3.025	.945	.117	Test of homogeneity of variance: Levene F(2, 192)=.494 (Mr. .611); ANOVA test: F=.188 (Mr. .829) - no significant difference observed between groups
	In-sourcing	2.923	.995	.123	
	Crowd-sourcing	2.959	.946	.117	
Willingness to pay a premium price	Make together	2.854	.814	.101	Test of homogeneity of variance: Levene F(2, 192)=2.084 (Mr. .127); ANOVA test: F=.666 (Mr. .515) - no significant difference observed between groups
	In-sourcing	2.785	.944	.117	
	Crowd-sourcing	2.669	.997	.124	
Corporate charitable contribution	Make together	3.286	.971	.120	Test of homogeneity of variance: Levene F(2, 192)=1.415 (Mr. .245); ANOVA test: F=1.169 (Mr. .313) - no significant difference observed between groups
	In-sourcing	3.375	.864	.107	
	Crowd-sourcing	3.523	.837	.104	
Credibility of the reetailer	Make together	2.849	.875	.109	Test of homogeneity of variance: Levene F(2, 192)=.428 (Mr. .652); ANOVA test: F=.611 (Mr. .544) - no significant difference observed between groups
	In-sourcing	3.009	.962	.119	
	Crowd-sourcing	3.006	.989	.123	
Trust in the retailer	Make together	2.792	.958	.119	Test of homogeneity of variance: Levene F(2, 192)=.414 (Mr. .662); ANOVA test: F=2.286 (Mr. .104) - no significant difference observed between groups
	In-sourcing	*3.100*	*.958*	*.119*	
	Crowd-sourcing	*3.127*	*1.055*	*.131*	

Source: authors' elaboration

In order to facilitate a comparison of the variables analysed and the behaviour of the respondents, the three groups were compared based on the architectures identified in the study undertaken by Pellegrini et al. (2022) (RQ4). The degree of significance for each variable was measured using analysis of variance (ANOVA) (Bellini and Aiolfi, 2020). The results of the ANOVA analysis presented in Table 4 demonstrate that the only statistically significant difference between the three groups was in relation to initiative relevance. Within the context of a crowd-sourcing-based nudging stimulus, individuals exposed to this approach perceived the message as more relevant (mean = 3.512) compared to those who received the Make Together architecture message (mean = 3.108). It is hypothesised that retailers will favour the Crowd-sourcing model, as it fosters greater consumer engagement. While both models involve retailers and consumers, the higher level of consumer involvement in the Crowd-sourcing approach suggests a stronger impact of nudging techniques compared to the Make Together model.

No significant differences were identified between the groups for other variables. However, it is noteworthy that the Crowd-sourcing architecture demonstrated superior performance in terms of attitude, sense of constraint and persuasion, trust in the retailer, and corporate charitable contributions when compared to the other two models. Conversely, the Make Together architecture exhibited higher levels of intention to purchase sustainable products and willingness to pay a premium price compared to the other models. This outcome can be attributed to the Make Together approach requiring minimal consumer engagement while relying more on the retailer's resources. In contrast, the In-sourcing architecture was associated with higher perceived usefulness and retailer credibility.

In conclusion, this study provides a preliminary exploration of the effectiveness of digital nudging in promoting conscious and sustainable shopping. The findings confirm that digital nudging stimuli are effective in encouraging

sustainable behaviors, fostering free choice without generating a strong sense of constraint or persuasion among consumers. Notably, all three nudging architectures proved effective in promoting sustainable shopping, reinforcing prior theoretical expectations.

The findings of this study underscore the considerable promise of digital nudging in fostering conscious shopping and consumption, regardless of the implemented architectural framework. However, further examination reveals that the most impactful approach is the crowdsourcing model, characterized by its capacity to engage consumers at a high level. This model elicited the most substantial levels of consumer engagement and perceived relevance, indicating that collective action reinforces sustainability commitments. The In-sourcing model demonstrated the most significant impact on consumers' willingness to pay a premium price, likely due to the perceived personal investment in sustainability initiatives.

Retailers play a crucial role in enhancing consumer trust, as digital nudging mechanisms are perceived as credible and persuasive, underscoring the importance of brand reputation in sustainability messaging. The psychological dimensions of digital nudging effectiveness are also evident: perceived autonomy and motivation were higher in the crowdsourcing model, while perceived obligation was greater in the in-sourcing initiatives. These findings reinforce the conclusions of Pellegrini et al. (2022), emphasizing that greater consumer involvement enhances the impact of digital nudging strategies.

Research limitations. *The present study is not without its limitations. Firstly, the analysis itself was hindered by the fact that each group provided only one independent data point, which made it challenging to achieve sufficient statistical power. This issue is further compounded by the difficulties of conducting online studies, where controlling for external variables is problematic, and the between-group analysis method presents significant constraints when testing a large set of parameters (Charness et al., 2012). The initiatives employed in this study were hypothetical, allowing for the possibility of uncertainty due to the potential influence of variations in message wording or the introduction of different initiatives on the research outcomes. Furthermore, the selection of the supermarket chain was delegated to the participants to circumvent potential bias associated with prior familiarity with a particular retailer. However, it should be noted that retailers adopt diverse approaches to sustainability, which might have affected responses. While this study provides valuable insights into the role of digital nudging in promoting sustainable consumer behaviour, it is essential to acknowledge the limitations inherent in the study design. Firstly, the study made use of an online survey-based experiment, a method that, whilst appropriate for digital nudging research, may not fully capture real-world shopping behaviours. Future studies could incorporate field experiments to validate these findings in actual retail environments. Secondly, the sample consisted of 195 participants, a number sufficient for statistical testing but not necessarily representative of broader consumer populations. Expanding the sample to include diverse demographic and cultural backgrounds would enhance the generalizability of the findings. The self-reported nature of the data introduces the possibility of social desirability bias, where respondents may overstate their willingness to engage in sustainable behaviours. Complementary methods, such as behavioural tracking or observational studies, could mitigate this limitation. Finally, this study is notable for its focus on the short-term impact of digital nudging interventions. It is recommended that future research employ longitudinal analyses in order to determine whether digital nudging leads to lasting behavioural changes in sustainability-oriented consumption.*

Managerial implications. *The present study should be of high relevance to retailers, whose role has been confirmed as essential in stimulating conscious and sustainable consumer behaviour (Smith, 2023). Digital nudging enables retailers to gain high levels of credibility and trust from consumers, who perceive them as reliable sources for useful and relevant messages, reinforcing a positive charitable image. Given consumers' favourable perceptions of companies' charitable commitments, retailers might consider forming partnerships with reputable charitable organization. Collaborative efforts in support of social and environmental causes can further strengthen retailers' image and positively influence consumer behaviour. Retailers can leverage these insights to design tailored digital nudging strategies that align with consumer psychology and engagement preferences. Specifically, investing in Crowd-sourcing initiatives can maximize consumer participation and drive long-term behavioural change. At the same time, integrating incentive structures - such as loyalty points or exclusive offers - within the in-sourcing model can enhance consumer commitment by increasing perceived personal gain. Transparent communication and ethical framing are also crucial to ensuring that digital nudging is not perceived as manipulative, ultimately strengthening brand trust (Smith, 2023). A comprehensive strategy integrating all three nudging architectures has the potential to yield optimal outcomes, enabling retailers to address a diverse range of consumer segments and preferences.*

Furthermore, the incorporation of educational components into nudging messages has been demonstrated to enhance consumers' comprehension and acknowledgement of the consequences of their decisions, thereby facilitating more informed and deliberate choices. The positive responses to the Crowd-sourcing model suggest that retailers may benefit from exploring collaborative initiatives that involve consumers in decision-making processes, enhancing consumer engagement and fostering a sense of co-creation, contributing to greater loyalty.

In light of the aforementioned points, it is imperative for retailers to perpetuate their investment in digital nudging for sustainability, thereby cultivating novel competencies and insights to promote future conscious behaviour, elevate their reputation, and propel comprehensive business success. This necessitates an enduring dedication to sustainability messaging and initiatives, with the demonstration of continuity over an extended period serving to fortify retailer credibility and nurture consumer confidence. Furthermore, it is paramount for retailers to furnish their personnel with the requisite competencies and aptitudes to adeptly operationalize and communicate nudging strategies. Employees who

understand digital nudging principles and architectures can provide better support to consumers, improving both the customer experience and the impact of sustainability initiatives. One of the critical challenges retailers must address is ensuring security and data privacy. The use of digital nudging requires retailers to implement clear communication and transparent practices regarding data usage to safeguard consumer trust, which is a key element in building credibility and ensuring the effectiveness of nudging initiatives.

It is recommended that future research investigate how cultural differences influence the perception and effectiveness of digital nudging strategies, given that attitudes towards sustainability and consumer autonomy may vary across contexts. In addition, longitudinal studies are required to determine whether digital nudging fosters lasting behavioural change or merely triggers short-term reactions. Ethical considerations should also be explored, particularly regarding consumer autonomy and the potential for manipulative effects. Finally, examining the role of artificial intelligence and machine learning in refining and personalizing digital nudging interventions could offer valuable insights into enhancing their effectiveness at an individual level.

Originality of the paper. *The present study makes a unique contribution to the existing literature on digital nudging and sustainability by empirically testing the effectiveness of distinct digital nudging architectures within the domain of sustainable shopping. Previous research has examined digital nudging in various contexts, but the present study is among the first to integrate behavioural economics, consumer psychology and digital marketing to offer a comprehensive and nuanced analysis of how different nudging strategies affect consumer decision-making.*

This research represents a significant endeavour in the field, as it is the first study to categorize and measure digital nudging in the context of conscious and sustainable consumption. The study provides a foundation for the development of effective sustainability marketing campaigns by leveraging digital technologies and nudging theory. By evaluating three different digital nudging architectures, the study highlights their differential impact on consumer engagement, purchase intentions, and price sensitivity. The study identifies Crowd-sourcing as the most effective strategy for fostering consumer engagement and in-sourcing as the most influential in driving willingness to pay, marking a key theoretical and practical advancement. Furthermore, while this study provides a solid basis for understanding digital choice architecture and consumer motivation, future research should explore the role of emerging technologies-such as AI-driven personalization and blockchain transparency-in shaping sustainability marketing. In addition, the exploration of the ethical considerations and long-term effects of digital nudging interventions would further contribute to the development of responsible and effective strategies for influencing sustainable consumer behaviour. These insights provide valuable guidelines for retailers seeking to implement digital nudging strategies that align with consumer psychology and engagement preferences.

Keywords: *digital nudging, sustainability, consumer behavior, choice architecture, conscious consumption.*

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Diversità di genere nella leadership: Un fattore chiave per la resilienza d'impresa?

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Abstract

Questa ricerca indaga se e in che modo la diversità di genere nella leadership delle imprese influenzi la loro resilienza a seguito di shock esogeni, analizzando diverse fasi temporali, ovvero la fase di resistenza *e la fase di* ripresa a livello settoriale. *In particolare, ipotizziamo che, nella fase di resistenza successiva ad uno shock esogeno, la composizione della leadership abbia un ruolo determinante nella capacità di un'impresa di fronteggiare lo shock. Nello specifico, ipotizziamo che una maggiore diversità di genere nel consiglio di amministrazione (CdA) possa indebolire la capacità dell'impresa di resistere allo shock, mentre una leadership esecutiva più diversificata possa avere un effetto positivo sulla resilienza. Tuttavia, con il passaggio alla fase di ripresa, il ruolo della diversità di genere nella leadership cambia. In questo contesto, una maggiore diversità di genere nel CdA potrebbe favorire il recupero dell'impresa, mentre una leadership esecutiva più diversificata potrebbe avere un impatto negativo sulla sua resilienza. Utilizziamo un campione di 485 imprese europee quotate, osservato nel periodo compreso tra il 2014 e il 2023 e deduciamo empiricamente le diverse fasi di resistenza e ripresa sulla base della performance di settore a seguito dei due shock. Nello specifico, identifichiamo il biennio 2017-2018 come una fase di resistenza, determinato dalla guerra commerciale tra Stati Uniti e Cina, seguita da una fase temporale di ripresa (2018-2020). Il periodo 2020-2023 è, invece, interpretato come un'ulteriore fase di resistenza a causa della pandemia COVID-19. Per testare le nostre ipotesi, adottiamo un modello panel dinamico e un approccio controfattuale per ottenere previsioni dei prezzi di chiusura delle azioni delle imprese nelle tre fasi temporali. La serie controfattuale dei prezzi di chiusura delle azioni viene confrontata con i corrispondenti valori osservati, e la differenza tra i due rappresenta la nostra misura di resilienza d'impresa. I risultati della ricerca mostrano che la diversità di genere nella leadership-sia nel CdA che tra i dirigenti esecutivi-ha un impatto significativo sulla resilienza delle imprese. Tuttavia, questo impatto cambia a seconda della fase temporale analizzata (fase di resistenza e di ripresa) e del tipo di shock esogeno che l'impresa affronta. Tali differenze si spiegano con la diversità di ruoli e responsabilità che i CdA e i dirigenti esecutivi devono gestire nelle varie fasi e in risposta a differenti tipi di shock. Questo studio apporta tre contributi principali. Primo, approfondisce la natura contestuale della resilienza d'impresa, mostrando come l'effetto della diversità di genere nella leadership vari in base alla fase temporale e alla natura dello shock esogeno. Secondo, arricchisce la teoria degli* upper echelons, *evidenziando il ruolo distinto della diversità di genere nel CdA e nella leadership esecutiva. Infine, introduce un contributo metodologico, adattando un modello statistico usato per misurare la resilienza a livello macro all'analisi della resilienza d'impresa*[5].

Inquadramento della ricerca. *Conflitti, pandemie, crisi ambientali e rapidi avanzamenti tecnologici sono eventi in grado di provocare effetti perniciosi sulle performance d'impresa (Korber & McNaughton, 2018), di conseguenza, le imprese devono coltivare la loro resilienza (Beamish & Hasse, 2022; Conz & Magnani, 2021; Rannucci & Wang, 2024), ossia la loro capacità di adattarsi a uno shock durante la fase di resistenza e di sfruttare le nuove condizioni durante la fase di ripresa (Martin, 2012). Con l'aumento della frequenza e dell'intensità degli shock esogeni imprevisti, la resilienza è diventata un tema centrale negli studi di management (Aversa et al., 2024; Hepfer & Lawrence, 2022; Hillmann & Guenther, 2021; Iftikhar et al., 2021).*

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In questo dibattito, gli studiosi rilevano che la leadership deve adottare azioni efficaci per affrontare gli shock esogeni e accrescere la resilienza delle imprese (Akgün & Keskin, 2014). Inoltre, recenti studi hanno esaminato come la composizione del CdA (ad esempio, il numero di amministratori indipendenti e le dimensioni del CdA; Croci et al., 2024) e le caratteristiche individuali dei dirigenti esecutivi (ad esempio, l'avidità del CEO; Sajko et al., 2021), nonché le interazioni tra questi livelli di leadership (Ranucci & Wang, 2024), influenzino la resilienza delle imprese dopo uno shock esogeno.

Tuttavia, la ricerca su come la diversità di genere nei CdA e tra i dirigenti esecutivi possa, grazie all'integrazione di esperienze e prospettive diverse (Cox et al., 1991; Mendiratta & Tasheva, 2024), migliorare la resilienza delle imprese, è ancora limitata (Azeem et al., 2023; Sun et al., 2015). La maggior parte degli studi si è concentrata sulla diversità di genere (Triana et al., 2014) e sulla presenza di donne (Azeem et al., 2023) nei CdA. Solo pochi hanno esplorato la diversità di genere nei ruoli dirigenziali esecutivi (ad esempio, il ruolo di CEO; Shropshire et al., 2021; Tiscini et al., 2023). Questi studi suggeriscono che, sebbene le imprese possano soddisfare le quote rosa nei CdA, ciò non si traduce necessariamente in una diversità di genere nella leadership esecutiva (Dezső et al., 2016; Matsa & Miller, 2013). Di conseguenza, l'attenzione al CdA ha paradossalmente ridotto l'analisi della diversità di genere nella leadership esecutiva, la quale è direttamente responsabile per l'attuazione delle azioni strategiche e l'esecuzione operativa durante periodi di crisi delle imprese (Håkonsson et al., 2012; Van Essen et al., 2013). Al contrario, l'enfasi sulla diversità di genere tra i dirigenti esecutivi ha distolto l'attenzione dal ruolo cruciale del CdA, il quale è responsabile del monitoraggio dei dirigenti e dell'allineamento degli interessi degli stakeholder per supportare la performance a lungo termine dell'impresa (Hendry & Kiel, 2004; Smulowitz & Smulowitz, 2024). Inoltre, resta da chiarire se le caratteristiche specifiche dei CdA e dei dirigenti abbiano un impatto universale sulla resilienza, o se tale impatto vari in funzione del contesto in cui l'impresa opera (Schaedler et al., 2022). Le diverse fasi che seguono uno shock esogeno (Martin, 2012) danno origine a contesti distinti, ciascuno dei quali presenta sfide specifiche che il CdA e i dirigenti esecutivi devono affrontare.

Obiettivo del paper. *Sulla scorta della teoria degli upper echelons (Cho & Hambrick, 2006; Hambrick & Mason, 1984), il presente studio si pone l'obiettivo di esplorare come la diversità di genere nel CdA e tra i dirigenti esecutivi influenzino la resilienza delle imprese a seguito di shock esogeni. In particolare, esaminiamo l'impatto della diversità di genere, nei due livelli di leadership, sulla resilienza delle imprese, analizzando i suoi effetti attraverso due fasi temporali distinte: la fase di resistenza innescata dagli shock esogeni e la successiva fase di ripresa.*

Metodologia. *Per rispondere alla nostra domanda di ricerca, stimiamo un modello panel dinamico su un campione composto da 485 imprese europee quotate, analizzate nel periodo 2014-2023. Tale modello è stato utilizzato per rappresentare accuratamente le relazioni economiche, tenendo conto delle dipendenze temporali e cross-sectional. Utilizzando i prezzi di chiusura delle azioni delle imprese come proxy delle performance d'impresa (DesJardine et al.2019; Ortiz-de-Mandojana & Bansal, 2016), identifichiamo empiricamente tre fasi temporali, a livello settoriale, a seguito di shock esogeni: il periodo 2017-2018 come fase di resistenza, determinato dalla guerra commerciale tra Stati Uniti e Cina, seguito da una fase di ripresa (2018-2020), e il periodo 2020-2023 come ulteriore fase di resistenza causata dalla pandemia di COVID-19. Partendo dalle stime del modello panel e seguendo un approccio controfattuale, così come adottato da Doran e Fingleton (2018) a livello macro, determiniamo una misura di resilienza a livello di impresa. Successivamente, attraverso il ricorso a un'analisi di regressione lineare, la misura di resilienza è stata utilizzata per testare le nostre ipotesi al fine di esplorare se la resilienza delle imprese agli shock esogeni sia influenzata da differenze nelle caratteristiche interne all'impresa, in particolare dalla diversità di genere nei due livelli di leadership.*

Per ragioni di parsimonia, in questo short paper *presentiamo esclusivamente i risultati del modello finale, che consente di analizzare l'impatto della diversità di genere nella leadership come elemento determinante per la resilienza d'impresa.*

Tab. 1: Risultati dell'analisi empirica

Variable	Fase di Resistenza (2017–2018)			Fase di Recupero (2018–2020)			Fase di Resistenza (2020–2023)		
	Estimate	Std. Error	p-value	Estimate	Std. Error	p-value	Estimate	Std. Error	p-value
Intercept	0.131574	0.160869	0.4143	0.627967	0.224637	0.00564	0.461286	0.581708	0.42880
BGD_2017_2018	0.251720	0.130724	0.0554	0.460559	0.201781	0.02341	-0.427748	0.548604	0.43656
EGD_2017_2018	0.176582	0.105105	0.0943	-0.047547	0.141105	0.73646	0.266756	0.291351	0.36107
SP_2017_2018	0.001661	0.069436	0.9809	-0.061273	0.089311	0.49340	0.555926	0.168700	0.00118
IndBM_2017_2018	0.001065	0.001450	0.4636	-0.003932	0.002090	0.06128	-0.001348	0.004068	0.74072
BS_2017_2018	-0.022217	0.010127	0.0293	-0.036032	0.014064	0.01108	0.023733	0.028237	0.40171
SPS_2017_2018	-0.001011	0.001539	0.5120	0.001034	0.002093	0.62178	-0.005527	0.003897	0.15771
IndProf_2017_2018	0.068387	0.062260	0.2732	-0.129797	0.081177	0.11126	0.017296	0.167503	0.91787
IndProd_2017_2018	-0.066257	0.063627	0.2988	-0.154454	0.084141	0.06775	-0.349164	0.168906	0.04010

Risultati. *I risultati mostrati nella tabella sopra rivelano che l'effetto della diversità di genere nella leadership sulla resilienza d'impresa possa dipendere dalle fasi temporali e dalla natura dello shock esogeno; queste divergenze derivano dai ruoli e dalle responsabilità differenti che i CdA e i dirigenti devono ricoprire in una fase di resistenza scaturita da uno shock esogeno e nella successiva fase di ripresa.*

Nella fase di resistenza (2017-2018) causata dalla guerra commerciale tra Stati Uniti e Cina, la diversità di genere all'interno del CdA esercita un effetto positivo sulla resilienza d'impresa, suggerendo che la presenza femminile favorisca un approccio più collaborativo con i dirigenti esecutivi. Questo risultato non corrobora la nostra ipotesi secondo cui una maggiore rappresentanza femminile nel CdA rafforzerebbe la funzione di monitoraggio del CdA sulla leadership esecutiva, determinando un impatto negativo sulla resilienza d'impresa come dimostrato nel lavoro di Croci et al. (2024). Questi risultati evidenziano come la natura articolata e contingente delle caratteristiche del CdA, dimostrando che alcuni elementi, come la diversità di genere, possono influenzare positivamente la resilienza attraverso meccanismi che trascendono il ruolo di controllo del CdA sui dirigenti esecutivi (Rosener, 1995; Smulowitz & Smulowitz, 2024). Nel medesimo periodo, la diversità di genere tra i dirigenti esecutivi influenza positivamente la resilienza d'impresa.

Nella fase di resistenza (2020-2023) causata dalla crisi della pandemia di COVID-19, i nostri risultati mostrano che la diversità di genere nella leadership non ha alcun effetto statisticamente significativo sulla resilienza d'impresa. La pandemia di COVID-19 ha rappresentato una crisi esistenziale, con conseguenze profonde di carattere fisico, emotivo e sociale per individui e imprese. La complessità di questa crisi (Tiscini et al., 2023), unita alla sua prolungata incertezza (Compagni et al., 2024), potrebbe aver diluito i benefici specifici della diversità di genere nella leadership. Ad esempio, le decisioni e le azioni della leadership durante questo periodo sono state probabilmente influenzate più da vincoli esterni-come le disposizioni normative sanitarie (Chen et al., 2023) e le interruzioni nelle catene di approvvigionamento (Choudhury et al., 2022) -piuttosto che dalle caratteristiche interne della leadership. Questo contesto potrebbe aver annullato la rilevanza della diversità di genere nella leadership come precursore della resilienza d'impresa.

Durante la fase di ripresa nel periodo 2018-2020, la diversità di genere nel CdA ha un impatto positivo sulla resilienza, mentre quella nella leadership esecutiva perde rilevanza, risultando non significativa. Questo cambiamento evidenzia il ruolo strategico cruciale dei CdA nella fase di ripresa che richiede compiti come la pianificazione a lungo termine e la ridefinizione della strategia, tipiche responsabilità degli amministratori (Zahra et al., 2009; Boivie et al., 2016). In questo contesto, le prospettive diverse date da un bilanciamento dei generi nei CdA possono giocare un ruolo più prominente rispetto alla leadership esecutiva nel trattare nuove informazioni, favorendo un equilibrio tra le esigenze operative a breve termine e gli obiettivi strategici di lungo periodo.

Limiti della ricerca. *Come ogni ricerca, anche questo studio non è scevro di limitazioni che rappresentano anche stimoli per nuove investigazioni teoriche ed empiriche. In primo luogo, per la valutazione della resilienza noi utilizziamo i prezzi di chiusura delle azioni come proxy della performance. Sebbene questa prassi sia consolidata in letteratura e, come sottolineano DesJardine et al. (2019, p. 1456; trad. nostra), "i prezzi delle azioni sono tra i migliori indicatori disponibili per valutare la resilienza", noi riconosciamo che le dinamiche dei mercati finanziari possano introdurre distorsioni nei risultati. Questo è oltremodo vero nel contesto di alcuni mercati finanziari europei caratterizzati da una minore efficienza, dove il trading speculativo e le dinamiche legate alle aspettative dei risparmiatori possono influenzare più facilmente i prezzi azionari delle imprese. Ricerche future potrebbero integrare ulteriori indicatori di resilienza d'impresa. In secondo luogo, la nostra analisi non tiene conto del fenomeno del "glass cliff", secondo cui le donne tendono a essere nominate in posizioni di leadership durante periodi di crisi (Sun et al., 2015). Studi futuri potrebbero esplorare se e in che misura questo fenomeno incida sul contributo delle donne alla resilienza delle imprese. Infine, il nostro studio si concentra sulla "surface-level diversity" (Tonoyan & Olson-Buchanan, 2023; trad. nostra), ossia su attributi osservabili come il genere, assumendo implicitamente che individui di generi diversi presentino differenze nei processi cognitivi (Smulowitz & Smulowitz, 2024). Tale assunzione appare coerente con l'idea che la resilienza cognitiva-definita come la "capacità di notare, interpretare, analizzare e rispondere ai cambiamenti" -possa variare in funzione della composizione di genere nella leadership (Dewald & Bowen, 2010, p. 199; trad. nostra). Inoltre, il nostro modello non considera caratteristiche più difficilmente rilevabili, quali valori, competenze e tratti della personalità, che potrebbero avere un ruolo determinante nel plasmare la resilienza d'impresa. Pertanto, ricerche future potrebbero adottare una prospettiva più ampia, includendo misure di diversità ad un livello più profondo (Tonoyan & Olson-Buchanan, 2023) per cogliere in modo più completo l'impatto che la composizione della leadership ha sulla resilienza delle imprese.*

Implicazioni pratiche. *Il nostro studio offre due principali implicazioni per i manager. In primo luogo, evidenzia il ruolo cruciale della composizione della leadership nel rafforzare la resilienza d'impresa. I nostri risultati mostrano che la diversità di genere nella leadership tende ad agire positivamente sulla resilienza o, al più, a non produrre effetti significativi, senza mai risultare dannosa. Tuttavia, il suo impatto dipende dal livello di leadership in cui si manifesta-CdA e dirigenti esecutivi-e dal contesto temporale -fase di resistenza e di ripresa- in cui l'impresa sta operando in seguito a uno shock. In secondo luogo, la relazione tra diversità di genere e resilienza è modulata dalla natura dello shock esogeno subito dall'impresa (ad esempio, economico in senso stretto rispetto a un'emergenza sanitaria). Sottolineiamo, dunque, la necessità per i manager di adottare strategie di leadership flessibili e adattabili, calibrandole sulle specificità di ciascun tipo di shock, così da rendere la risposta d'impresa più efficace di fronte alle sfide esterne.*

Originalità del paper. *Il presente studio, ancora* in fieri, *mira ad offrire tre contributi principali. In primo luogo, arricchisce la letteratura sulla resilienza delle imprese, approfondendo la comprensione della sua natura contestuale (Ducheck, 2020; Su & Junge, 2023). In particolare, esplora come l'effetto della diversità di genere nella leadership sulla resilienza d'impresa dipenda dal contesto temporale a seguito di uno shock esogeno, distinguendo tra fasi di resistenza e di ripresa, e dalla natura dello shock. Questa distinzione si rivela cruciale, poiché le diverse fasi temporali e/o i differenti tipi di shock richiedono, a ciascun livello di leadership, sfide specifiche per affrontare uno shock.*

In secondo luogo, il lavoro contribuisce alla teoria degli upper echelons*, rivelando come gli attributi collettivi della diversità di genere, sia nel CdA che tra i dirigenti esecutivi, influenzino la resilienza delle imprese in modo distinto. Tale effetto si manifesta in virtù dei ruoli che ciascun livello di leadership ricopre durante le fasi successive a uno shock esogeno, con la diversità di genere che agisce in maniera specifica in relazione alle funzioni e responsabilità che il CdA e i dirigenti esecutivi detengono.*

Infine, lo studio offre un significativo contributo metodologico alla misurazione della resilienza d'impresa, adottando per la prima volta un approccio precedentemente utilizzato per la valutazione della resilienza regionale e applicandolo con successo a livello d'impresa (Doran & Fingleton, 2018; Costantino et al., 2023).

Parole chiave: *resilienza; diversità di genere; leadership; upper echelons*

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Leveraging DEI to Foster a Sustainable Work Context: A Study on Italian Employees

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Abstract

This study deals with the comprehensive concept of sustainability, which includes the social dimension besides the environmental and governance dimensions. In particular, it examines how organisations approach Diversity, Equity, and Inclusion (DEI), focusing on the internal levers that support DEI efforts through both symbolic and tangible actions, i.e. diversity communication and diversity-oriented leadership, which can have an impact on creating an inclusive climate and employee engagement, which in turn influences employees' Organisational Citizenship Behaviour (OCB). A research model is used to hypothesise the path from these levers (antecedents) to creating an inclusive climate and employee engagement (mediators), which ultimately impacts employees' OCB (behavioural outcomes). The preliminary results of a survey on a sample of 302 employees in Italy confirm that the antecedent variables have direct and positive associations with the two mediating variables. The two mediating variables also show a direct and positive association with OCB. In addition, the model shows the mediating role of both inclusive climate and employee engagement between diversity communication and OCB and between diversity-oriented leadership and OCB, but with stronger values for employee engagement. Overall, this study highlights the critical role of diversity-driven leadership in fostering DEI-conscious attitudes and behaviours, while promoting a true culture of inclusion. Although less impactful, diversity communication can complement leadership efforts by providing context and relevant information to help employees understand DEI strategy, programmes and the benefits of DEI interventions. This study is a response to the lack of studies on the essential role that diversity-oriented leadership and communication levers within organisations play in planning and executing an effective DEI strategy, looking at both tangible (i.e. diversity-oriented leadership) and symbolic (i.e. diversity communication) dimensions.

Purpose of the paper. *This study examines how organisations approach DEI (Diversity, Equity, and Inclusion) as part of the social dimension of their sustainability efforts. The focus is on the internal levers that support DEI efforts through both symbolic and concrete actions, i.e. diversity communication and diversity-oriented leadership, which have a particular impact on creating an inclusive climate and employee engagement towards DEI measures, which in turn has an impact on employees' Organizational Citizenship Behaviour (OCB).*

Framing of the research. *Diversity has undeniably become a key business priority and an essential practice for modern organisations, driven by demographic changes, a globalised corporate landscape, best practices of multinational companies, increased societal demands for responsible corporate behaviour from internal and external stakeholders, and the collective goals of the UN 2030 Agenda for Sustainable Development (Ravazzani et al., 2025; Wolfgruber et al., 2021). Indeed, efforts to create a workplace that reflects the values of equality and promotes people's growth as well as economic growth can serve to address the social dimension of business sustainability internally and, in particular, contribute specifically to Goal 5 (Gender equality), Goal 8 (Decent work and economic growth) and Goal 10 (Reduce inequalities) of the UN 2030 Agenda for Sustainable Development. In addition, several scholars are increasingly pointing out the close links between workplace diversity and CSR, as DEI management is one of the main areas of concern for internal CSR (Hameed et al., 2016) and its external communication (Maier & Ravazzani, 2019).*

In relation to the DEI acronym, Hays-Thomas (2023) states that "diversity" refers to the differences between employees, "equity" refers to the outcomes for employees (e.g. promotion) along with the organisational practices that influence these outcomes, while "inclusion" describes the psychological state in which employees feel a sense of belonging

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and recognition of their uniqueness in the workplace. Organisations approach DEI in different ways, influenced by factors such as organisational culture, management perspectives, national legal and societal characteristics (Jonsen et al., 2011; Ravazzani, 2025). The resulting approach may differ in terms of overarching DEI goals, dimensions of diversity in focus (e.g., gender, age, religion, professional experience), and practical initiatives and programmes. Overall, a DEI strategy aims to optimize the potential of all people in an inclusive organisation based on an appreciation of the different qualities that make up each individual's unique identity, while contributing to the achievement of organisational goals (Ravazzani, 2025).

DEI research (e.g. Mor Barak, 2017) has highlighted the key benefits of strategic and intentional organisational approaches to managing diversity in the workplace, such as improving employee satisfaction, retaining talent, fostering innovation and reputation. However, more needs to be understood about the impact of organisational levers used to promote DEI strategy internally through symbolic and concrete actions, and in particular diversity communication and diversity-oriented leadership, which is the focus of this study. Furthermore, a more comprehensive understanding of the pathway leading from these levers (antecedents) to the creation of an inclusive climate and employee engagement (mediators), ultimately impacting employee organizational citizenship behaviours (behavioural outcomes), is required.

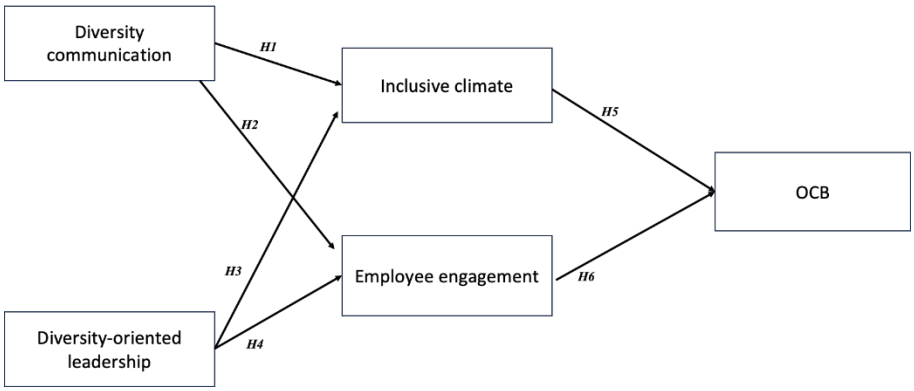
For these reasons, this study proposes a model that includes the following key constructs. First, 'diversity communication' which is intended as "communication that signals an organization's initiatives in caring, recognizing, and supporting employees from all backgrounds" (Men et al. 2023, p. 5). Internal communication is an important lever to break down communication barriers related to DEI issues and to outline the rationale and actions of the DEI strategy (DeConinck et al., 2008; Wahl & Einwiller, 2023). Second, 'diversity-oriented leadership', which consists of "leadership behaviors that invite and appreciate the contributions of employees of diverse backgrounds and characteristics" (Lee et al., 2021, p. 2). Thus inclusive and empathic leadership that is sensitive to DEI also plays a particular communicative role in shaping perceptions of an inclusive workplace through supportive actions (Wolfgruber et al., 2021). Third, an 'inclusive climate' that "enables individuals with diverse backgrounds to be themselves, feel a sense of belonging to the group, and treated equally, and express their unique identity" (Men et al. 2023, p. 6). Creating a sense of inclusion creates a perception among employees of a fair workplace where they know they will be treated equally regardless of their different backgrounds (Mor Barak, 2017; Wahl & Einwiller, 2023). Fourth, 'employee engagement', where "employees who are connected to the values and mission of the company, feel empowered, bring energy, passion, and discretionary effort to their jobs, and serve as advocates" (Ewing et al., 2019, p. 4). The literature dealing with internal communication and diversity has already shown that this enduring motivational and psychological state of employees is one of the main outcomes of diversity-oriented leadership and internal communication practices (Lee et al., 2021). Finally, 'organisational citizenship behaviours' (OCB), which represent supportive work behaviours that go beyond the job description and manifest themselves in the three areas of loyalty, obedience and participation (van Dyne et al., 1994). The diversity literature suggests that OCB is more likely to occur as a behavioural outcome when employees perceive an inclusive climate in their workplace and feel engaged (Wahl & Einwiller, 2023).

Building on this, this study advances the following hypotheses:

- *H1: An organization's diversity communication is positively associated with an inclusive climate among employees.*
- *H2: An organization's diversity communication is positively associated with employee engagement.*
- *H3: Diversity-oriented leadership is positively associated with an inclusive climate.*
- *H4: Diversity-oriented leadership is positively associated with employee engagement.*
- *H5: An inclusive climate is positively associated with OCB.*
- *H6: Employee engagement is positively associated with OCB.*
- *H7: An inclusive climate mediates the effects of both diversity-oriented leadership and diversity communication on OCB.*
- *H8: Employee engagement mediates the effects of both diversity-oriented leadership and diversity communication on OCB.*

The model with key constructs and relationships is illustrated in Figure 1.

Fig. 1: Research model: the pathway leading from diversity communication and diversity-oriented leadership to employee organizational citizenship behaviours



Methodology. *The data was collected as part of a quantitative study in Italy, in which a convenience sample of 302 Italian employees took part in September 2024 using an online questionnaire. The sample was provided by the company SWG and consisted of employees from Italian private and public companies, excluding those in the education sector. Although this sampling method is not probabilistic and does not guarantee the representativeness of the population, it is valuable when random sampling is difficult due to a large and indeterminate population, and it still allows the identification of people with characteristics relevant to the study (Etikan et al., 2015). The questionnaire was written in Italian so that respondents could clearly understand the questions and the research context. The Brislin's (1970) back-translation method was used for all scales used in the model. The questionnaire contained the following measures related to the variables considered in the research framework (see Figure 1).*

Diversity communication was measured using the scale for diversity communication satisfaction developed by Wahl & Einwiller (2023), which was based on Downs and Hazen's (1977) scale on satisfaction with corporate information and reassessed by DeConinck et al. (2008) by adding "diversity and inclusion" to extend the measurement to satisfaction with corporate diversity information. The scale measures 6 items on a 6-point Likert scale ranging from 1 (very dissatisfied) to 6 (very satisfied). Examples of items are: "Communication about company policies and goals concerning diversity and inclusion" and "Communication about accomplishments and/or failures of my organization concerning measures which should promote diversity and inclusion".

Diversity-oriented leadership was measured using the scale for diversity-oriented leadership developed by Lee et al. (2022), which was originally adopted by Luu et al. (2019). The scale comprises 4 items on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). Examples of items are: "My manager is committed to a workforce representative of all segments of society" and "My manager asks for the input of employees that belong to different demographic and expertise groups".

Inclusive climate was measured using the scale developed by Wahl & Einwiller (2023), which goes back to Mor Barak (2016). The scale measures 6 items on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). Examples of items are: "I feel that I have been treated differently in my organization because of my race, gender, sexual orientation, religion, or age" and "In my organization employees are treated fair by managers, regardless of employees' race, gender, sexual orientation, religion, age or social background".

Employee engagement was measured using the scale for employee engagement originally developed by Men and Bowen (2017) and more recently employed by Lee, Li & Tsai (2021). The scale measures 9 items on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). Examples of items are: "One of the most exciting things for me is getting involved with things happening in my organization" and "I understand how my role impacts the mission and business goals of this company".

Organisational Citizenship Behaviour (OCB) was measured using the scale by Wahl & Einwiller (2023), which originates from van Dyne et al. (1994). The scale measures 3 subscales (Loyalty, Obedience and Participation) with 5 items each (15 items in total) on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). Examples of items are: "I go out of my way to defend my organization if someone says something negative about it" (Loyalty), "While at work, I make sure that my appearance meets my management's expectations" (Obedience) and "I share ideas for improvements with my colleagues" (Participation).

Frequencies, means, standard deviations and correlations were calculated for all variables. Previously validated scales were used in this study. The reliability of all scales was assessed using Cronbach's a. To evaluate potential effects of common method bias, Harman's single-factor test was conducted using confirmatory factor analysis (Podsakoff et al., 2003). The results showed that a single factor accounted for 40.2% of the variance among the five measures, indicating that common method bias was unlikely to be a significant concern.

The estimation of a SEM model with five latent variables was performed considering diversity communication (6 manifest indicators), diversity-oriented leadership (4 manifest indicators), inclusive climate (6 manifest indicators), employee engagement (9 manifest indicators) and OCB (15 manifest indicators). The model was performed using MPLUS 8 software to test the relationships between the detected variables and the mediation of inclusive climate and employee engagement.

In this study, the hypotheses were determined a priori (James et al., 2006), and a multiple mediation model was used. The goodness of fit of the model was assessed using the chi-square value ($\chi 2$), the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA) and the standardised root mean square residual (SRMR).

Results. *The final sample of 302 respondents was predominantly male (51 per cent), between 44 and 58 years old (43 per cent), and professional (60 per cent) working in the areas of administration, finance and control (22 per cent). In terms of the companies in which they work, they are mainly from the service sector (37 per cent) and have fewer than 500 employees (58 per cent).*

Table 1 shows the means, standard deviations, internal consistencies (Cronbach's α) and intercorrelations of the study variables. All reliability estimates were greater than 0.70, which confirms the reliability of all scales in the Italian context too. Firstly, it is important to point out that on average the sample shows a fair tendency towards diversity-oriented leadership (M= 4.16; SD=1.74), inclusive climate (M= 4.04; SD=1.34), employee engagement (M= 4.28; SD=1.42), OCB (M= 5.03; SD=1.07) and a downward tendency towards diversity communication (M=2.94; SD=1.27).

Secondly, almost all variables are statistically significant and are positively correlated with each other, with the exception of the OCB Obedience subscale, which correlates negatively with diversity communication, although this correlation is not significant (r = -0.102, p >0.05).

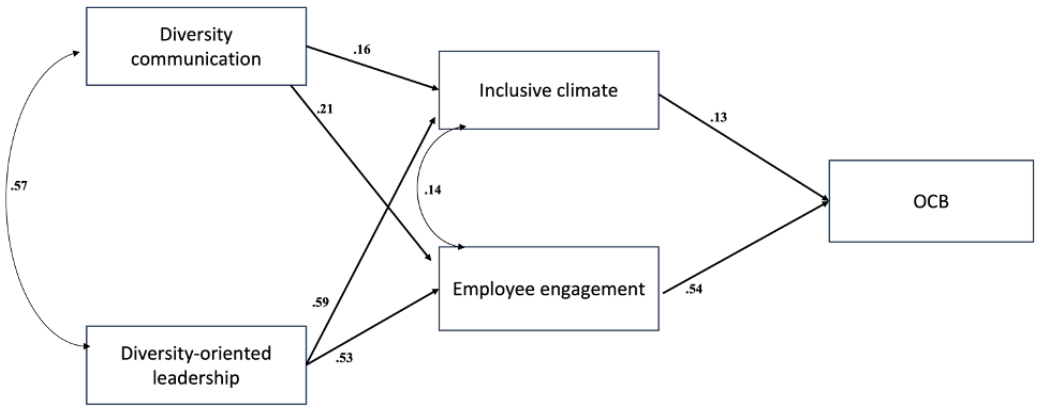
Tab. 1: Means, standard deviations, Cronbach's α and intercorrelations

	M	SD	Cronbach's a	1	2	3	4	5	6	7
1_Diversity communication	2.94	1.27	0.96							
2_Diversity-oriented leadership	4.16	1.74	0.96	0.576**						
3_Inclusive climate	4.04	1.34	0.81	0.510**	0.692**					
4_Employee Engagement	4.28	1.42	0.94	0.531**	0.688**	0.592**				
5_OCB	5.03	1.07	0.71	0.278**	0.512**	0.428**	0.642**			
6_OCB_Loyalty	*4.38*	*1.58*	*0.94*	*0.443***	*0.593***	*0.493***	*0.738***	*0.790***		
7_OCB_Obedience	*5.70*	*1.16*	*0.91*	*-0.102*	*0.153***	*0.170***	*0.200***	*0.729***	*0.274***	
8_OCB_Participation	*5.01*	*1.31*	*0.90*	*0.235***	*0.404***	*0.306***	*0.506***	*0.855***	*0.488***	*0.574***

**p <0.05, **p <0.01.*

The estimated SEM (Figure 2) showed satisfactory fit indices (Kline 2016), confirming the goodness of fit of the model: χ2 (9) = 554.991, p < 0.00, CFI = 0.99, TLI = 0.97, RMSEA = 0.07; SRMR = 0.04. The significance level for all statistical analyses was p< 0.05.

Fig. 2: Results of the estimated SEM.



In this model, the antecedent variables showed direct and positive associations with both the two mediation variables. Specifically, diversity communication showed a direct and positive association with inclusive climate (β = 0.16) and employee engagement (β = 0.21), confirming H1 and H2, and diversity-oriented leadership showed a stronger positive association with inclusive climate (β = 0.56) and employee engagement (β = 0.53), confirming H3 and H4. The two mediation variables also show a direct and positive association with the outcome, i.e. OCB, with a moderate association between inclusive climate and OCB (β = 0.13) and a stronger association between employee engagement and OCB (β = 0.54), confirming H5 and H6.

In addition, the model was able to demonstrate the mediating role of inclusive climate between diversity communication and OCB and between diversity-oriented leadership and OCB. Furthermore, the mediating role of employee engagement was found between diversity communication and OCB and between diversity-oriented leadership and OCB. More precisely, as shown in Table 2, three significant mediations were found among the two mediators, partially confirming H7 and fully confirming H8: with higher levels in the case of employee engagement as a mediator (diversity communication → employee engagement → OCB = β = 0.11; diversity-oriented leadership → employee engagement → OCB = β = 0.30); and with lower or not significant values in the case of the inclusive climate as a mediator (respectively, diversity-oriented leadership → inclusive climate → OCB = β = 0.07; diversity communication → inclusive climate → OCB = β = not significant).

Tab. 2: Indirect effects of the estimated SEM

Indirect Effects	Standardized Indirect Effects		
	Est.	s.e.	p
DC →IC →OCB	n.s.	0.01	0.06
DC →EE →OCB	0.11	0.03	0.00
DOL →IC →OCB	0.07	0.03	0.02
DOL →EE →OCB	0.30	0.03	0.00

Note. DC = Diversity Communication; IC = Inclusive Climate; OCB = Organizational Citizenship Behaviour; DOL = Diversity-Oriented Leadership; EE = Employee Engagement.

Research limitations. *This study has some limitations that future research could try to overcome. First of all, the data were collected in Italy. It would be necessary to repeat the same study in other countries for comparison. In addition, future studies should increase the sample studied and possibly use probability sampling to increase the generalisability of the results. Furthermore, this study could be repeated in the near future to see longitudinally whether the proposed research framework and the analysed relationships could change. Finally, while the relationships examined in this study are well-supported in existing literature, future research could explore alternative model pathways.*

Managerial implications. *The preliminary findings of this study emphasize the critical role of leadership in addressing the social dimension of business sustainability within the organisation, particularly with regard to the efforts a company makes to promote equality and people's growth as well as the economic dimension. In particular, the study highlights the impact of diversity-oriented leadership on fostering DEI-conscious attitudes and behaviours, while nurturing a genuine culture of inclusion. This is indeed made possible through meaningful action and role modelling of leaders on DEI issues. Building on this, an effective DEI strategy should involve leaders in both the planning and implementation phases, with targeted internal communication and training programmes that are specifically tailored to them and increase their awareness of DEI issues in the workplace. While less impactful, diversity communication can complement leadership efforts by providing context and relevant information to help employees understand DEI strategy, programmes and the benefits of DEI interventions. DEI strategists should pay particular attention to how this communication directly impacts employee engagement and, by extension, OCB and thus the behavioural dimension of employees. Promoting engagement and supporting the DEI strategy at all levels of the organisation is essential for effective DEI management.*

Originality of the paper. *This study is a response to the lack of studies regarding, on the one hand, the close links between DEI and internal CSR and sustainability efforts (Maier & Ravazzani, 2019) and, on the other hand, the essential role that communication levers within organisations (Wolfgruber et al., 2021; Ravazzani, 2025) play in the planning and execution of an effective DEI strategy, considering both symbolic (i.e. diversity communication) and concrete (i.e. diversity-oriented leadership) dimensions. In addition, it provides empirical evidence rooted in the Italian context, given the lack of studies outside the US and considering the influence of the macro-national context on how DEI is perceived and responded to by and within organisations (Jonsen et al., 2011).*

Key words: *diversity, equity and inclusion; diversity communication; diversity-oriented leadership; inclusive climate; employee engagement; organizational citizenship behaviours*

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Mapping the Stakeholder Network and Value Creation in Grassroots Football: Evidence from Italy

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Abstract

This study is a work in progress that aims to analyse the value creation process and map the stakeholder network of a grassroots football context in the Italian region of Lombardy. This study is conceptually and empirically grounded in stakeholder theory with a two-fold research aim. The first objective is to theoretically identify the main grassroots football stakeholders. The second objective is to examine the integrated value that they collectively generate through grassroots football and within the respective stakeholder ecosystem. Collectively, the value-based analysis in this study will help guide the development of a generic preliminary framework of stakeholder value co-creation and inter-relationship dynamics in the grassroots football context. Additionally, the study identifies and maps the relationship types of the different stakeholders involved by distinguishing between the primary stakeholders (e.g., federation, league, players, coaches, fans, sponsors, etc.) and the secondary stakeholders (e.g., local institutions, educational entities, mass media outlets, community members, non-profits, professional football clubs, etc.). The analysis also highlights how the integrated value of grassroots football emerges from the dynamic interaction between various types of stakeholders and materialises through three main value creation processes: (1) social inclusion and community integration, (2) economic sustainability, and (3) sport and educational training. Furthermore, this study advances stakeholder theory by providing a pragmatic framework, useful for guiding the strategic management of grassroots clubs, and with other policymaking implications that may further explicate the socio-economic significance derived from grassroots football. This study also contributes to the sport management literature by contributing more insights into the value co-creation process through grassroots football and within its stakeholder network, whilst also providing a replicable value-based model for future research on similar or different stakeholder networks in the broader sport sector.

Framing of the research. *Football is renowned as the world's most popular sport which constitutes an important segment in the sport industry and represents tremendous socio-economic values within local communities (Raiola et al., 2023; Roberts et al., 2016). Whilst the configuration of the football industry is a complex and dynamic environment comprising both football organisations and institutions at different levels and of different types, Roberts et al. (2016) and Todaro et al. (2023) denoted that the stakeholder ecosystem of football as a whole is intricate and multi-faceted with various types of stakeholders interacting and generating values in both social and economic terms.*

Grassroots football is a particular division of football that is neither professional nor elite, and its practical focus is participatory in nature, rather than performatory (UEFA, 2023). Thus, it is typically played by non-elite players at amateur levels for leisure and recreational purposes in various communal settings, including schools, youth sport clubs, local leagues, to name a few. This type of football plays a crucial role in promoting sport participation (Sugiyama et al., 2017), integrating communities, and developing the physical and social skills of participants of all ages (Hindmarsh et al., 2023). Previous research indicates the importance of grassroots football, not only for the technical training and development of players, but also for its wider socio-economic impacts in society at large (e.g., Raiola et al., 2023; Roberts et al., 2016). In this regard, the grassroots football ecosystem is formed by a myriad of stakeholders operating at a regional level, all the way to a more local or national governance structure, within which the relationship between clubs and stakeholders exists. According to Hindmarsh et al. (2023), grassroots football clubs are a complex ecosystem comprising differing types of stakeholders, including football governing bodies, professional clubs, grassroots clubs, local authorities, players, coaches, fans, sponsors, mass media outlets, community members, etc. These stakeholders collectively contribute to the value creation process within the system through the notions of sustainability and corporate social responsibility (CSR) (Daddi et al., 2021).

Another important aspect of grassroots football is its contribution to social cohesion and inclusion. Grassroots football clubs provide opportunities for sport participation to marginalised community members such as refugees and

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individuals from disadvantaged backgrounds, whilst also promoting their integration into local communities (Göçer et al., 2024). From an economic perspective, grassroots football has a significant impact on local economies. The study of Birdsall-Strong (2022) has illustrated that participation in grassroots football in the UK annually contribute over £10 billion to the national economy through various benefits related to physical and mental wellbeing, social development, and the creation of employment opportunities in the sport sector. From a governance and strategic perspective, grassroots football provides as a platform to promote inclusive sport participation and sustainability values within local communities. The study of Sugiyama et al. (2017) on the Japanese grassroots football, for instance, has highlighted how strategic investment in coach training and social inclusion initiatives through football has contributed to a constant growth in youth sport participation and an improvement in sport performance at a national level.

According to Woratschek et al. (2014), the value creation process in sport is not only intrinsic to sport events and activities, but it emerges through a dynamic and constant interaction between stakeholders. This systemic process makes football an effective medium for building social connections and strengthening local communities (Yiapanas et al., 2024). It is crucial to note that the football stakeholder environment is not a set of individual linkages but a systemic network of a variety of stakeholders with differing values, whose collective effort shapes the essence of the football ecosystem as a whole (Yiapanas et al., 2022). In this regard, grassroots football may serve as a platform for many stakeholders to co-create value. This study is situated in this particular context with certain key perspectives to highlight the role of grassroots football as an agent of social change, offer useful insights for sport academics, practitioners, and policy makers, and contribute to the broader academic debate on the value co-creation process involving different types of grassroots football stakeholders. Specifically, this study aims to provide a comprehensive stakeholder network and value co-creation analysis generated through the grassroots football and its stakeholder ecosystem based on an Italian regional context (i.e., Lombardy).

The theoretical framework of this study is grounded in the implications of stakeholder theory. Stakeholder theory is primarily concerned with understanding the nature of relationships between an organisation and its stakeholders who can be characterised as those "who can affect or be affected by the achievement of an organisation's objectives" (Freeman, 1984). A core implication of the theory is the purpose of a business being able to create value for all stakeholders (Freeman et al., 2010). The practical utility of stakeholder theory has been thoroughly examined in previous studies in relation to sustainability and stakeholder governance issues in the football industry (e.g., Daddi et al., 2021; Hernandez-Hernandez et al., 2023; Yiapanas et al., 2024). This perspective is also prolific for grassroots football, a context where the socio-economic value generated by clubs goes beyond sport-related outcomes and includes certain positive aspects of social cohesion and inclusion, youth development, and economic growth. Some studies have analysed the mapping of stakeholder networks of sport clubs and their social impacts (e.g., Mendizabal et al., 2020; Perechuda & Čater, 2021). Mendizabal et al. (2020) developed a detailed map of sport clubs' stakeholders, highlighting the importance of considering the value perceived by different stakeholders for a more comprehensive value-based analysis (Mendizabal et al., 2020). Perechuda & Čater (2021) highlighted how stakeholder perception influences the measurement of football clubs' value, suggesting a multi-dimensional approach to the evaluation of sport clubs' performance. Considering the aforementioned notions, our study proposes that the football stakeholder network can be mapped and inclusive of a wide range of stakeholders that can be divided into two main classifications: "primary" and "secondary" stakeholders.

Primary stakeholders are individuals who have a direct and continuous interaction with football clubs and are essential for their functioning. The primary stakeholders may consist of club owners and directors, players, technical staff, other managers and administrators, fans and supporters, community members, sponsors and commercial partners, football governing bodies and other authoritative figures, etc. Secondary stakeholders have an indirect role but contribute to the creation of social value in football networks. Some of these are educational institutions, sport clubs, non-profits, mass media outlets, associations, and other local institutions, etc.

In grassroots football, the role of stakeholders changes significantly (Hindmarsh et al., 2023). Grassroots clubs often rely heavily on voluntary commitment, the support of players' families and local publics, and private funding. The limited capital pushes these clubs to create closer cooperative networks with local institutions, educational entities, non-profit organisations, and social associations, etc. to sustain and support their operational activities. Likewise, the social value of football manifests in multiple dimensions, including social inclusion and cohesion, the promotion of healthy lifestyles, and the strengthening of local economies (Vrontis et al., 2014; Kunkel et al. 2017). Previous research has illustrated that football has a strong impact on the lives of its supporters, uniting different cultures, contributing to local development, and the creation of social identity (e.g., Hyndman & Liguori, 2024; Zagnoli & Radicchi, 2010). Furthermore, the football business and stakeholder networks collectively provide a significant support to the community through welfare, healthcare, and financial initiatives (Lapsley, 2024). In this regard, the socio-economic value produced through football is manifested through three main dimensions: (1) social and cultural value, (2) economic value, and (3) educational value. In the socio-cultural value, football is a tool for social cohesion by promoting inclusion and strengthening the sense of belonging within local communities. In the economic value, football clubs, including the amateur clubs, generate direct and indirect economic impacts through sport events, the involvement of local businesses, sport tourism, and other business-related activities (e.g., events, sponsorships, etc.). In the educational value, football plays a fundamental role in transmitting values such as fair play, respect, and teamwork. Through grassroots football, amateur clubs often collaborate with schools and other educational institutions for sport-related education projects and provide pathways for personal and professional growth amongst youth.

The analysis of stakeholders and the values associated with the grassroots football stakeholder network itself allows a better understanding of how football, even at the amateur level, can be an effective tool for socio-economic value enhancement. Therefore, mapping the dynamic interactions between stakeholders and assessing the socio-economic impact resulting from their activities are instrumental.

Purpose of the paper. *The aim of this study is twofold. First, it aims to map the stakeholder network in grassroots football by analysing their structure and dynamic interactions. Second, it aims to assess the value generated by those primary and secondary stakeholders in the network. To achieve the first objective, the stakeholders involved with grassroots football clubs will be identified, as suggested by Mendizabal et al. (2020) whose study has demonstrated how the classification of stakeholders based on their degree of influence and interest can allow a comprehensive understanding of the strategic role of a grassroots football stakeholder network. The analysis of the relationships between clubs, fans, sponsors, media, institutions, and other types of stakeholders will also help identify the mechanisms through which these stakeholders co-create value. Regarding the second objective, this study will rely on the football context-specific social value assessment frameworks developed by Yiapanas et al. (2024) and Perechuda and Čater (2021).*

Methodology. *This study adopts a qualitative approach based on an analysis of the main stakeholders of a grassroots football stakeholder network based in an Italian region, Lombardy. Starting from the review of the existing literature – particularly the methodology and theoretical framework developed by Yiapanas et al. (2024) – a three-step model was created to identify the stakeholders of Italian non-professional or grassroots football clubs (i.e., Amateur Sports Associations and Amateur Sports Clubs), their relationships, and the value categories associated with them. In Step 1, the stakeholders are identified and divided into their primary and secondary roles, whilst in Step 2, the relationships between the clubs and the stakeholders are defined (i.e., direct vs. indirect and formal vs. informal). Direct relationships occur when clubs interact with stakeholders without intermediaries (e.g. clubs vs. players), whilst indirect relationships occur through intermediaries (e.g. clubs vs. players' families). Formal relationships are structured and regulated by contracts, regulations, or institutional agreements (e.g. clubs vs. the league), whilst informal relationships are based on less structured interactions such as community involvement or spontaneous support from fans. Finally, in Step 3, the values created by each relationship are evaluated and classified into (1) social and cultural value, (2) economic value, (3) educational value.*

The developed theoretical model will be first validated by an expert panel potentially consisting of a number of sport management academics and practitioners. This panel may include various professionals in the sport sector, sport management academics, and other key stakeholders identified in the framework. Interviews will be conducted to collect the feedback and insights necessary for validating the theoretical framework with a proper emphasis on the peculiarities and characteristics of the Italian grassroots football context. These interviews will serve to confirm or adapt the categorisation of stakeholders and the mapping of their relationships and values, as well as to integrate any new emerging perspectives.

Preliminary results. *As this study is a work in progress, preliminary results can be presented to a certain extent for the first and second steps. Whereas the third step is less definitive with certain plans to be executed subsequently as per the description outlined in the methodology section.*

Step 1: Stakeholder identification and type of relationship (Preliminary findings)

In the context of grassroots football in Lombardy, grassroots football clubs represent the core of the stakeholder network. They operate as central actors, around which interactions develop between different individuals (hereby stakeholders) who contribute to the functioning, regulation, and overall support of sport-related activities (Birdsall-Strong, 2022).

Primary stakeholders are those stakeholders who interact directly with the football clubs and are essential to their operations. These amateur clubs are composed of owners and a management structure, who are responsible for the strategic and administrative functions, and players and staff, who are the individual athletes participating in training programmes and competitions and those who take care of the athletes and players respectively. In addition to those internal actors, amateur football clubs interact with a series of external stakeholders. Those may include the Italian Football Federation (FIGC) - Lombardy, the National Amateur League (LND) and other amateur sport associations, that regulate and supervise the football system and coordinate competitions. Local sponsors, on the other hand, guarantee direct financial support, contributing to the economic sustainability of amateur clubs and promoting their visibility, whilst suppliers provide essential equipment and services for the clubs' daily activities. The family members of athletes are another group of primary stakeholders, and they are responsible for providing financial and logistical support to young athletes and facilitating their continuous participation. Fans and local communities also play an essential role in creating a collective identity associated with the clubs, and they contribute to the aspects of social inclusion and cohesion and the sense of belonging.

On the other hand, secondary stakeholders are those subjects who influence the system through financial, logistical or other contributions despite their indirect involvement in the operational management of clubs. Local institutions, such as the local and regional municipalities, play an important role in providing infrastructural support and financing. Educational institutions such as schools and universities often collaborate with clubs to offer educational opportunities and sport training courses, thus creating and maximising the education vis-à-vis sport synergies. On a similar note, non-profit organisations and social associations cooperate with clubs on executing community development projects, using

sport (i.e., football) as a tool to promote the value of community integration. Mass media outlets and sport journalists contribute to the promotion and dissemination and coverage of sport activities and events, whilst also amplifying its impact and influence at a local or even a national level. Other secondary stakeholders include professional clubs, which also maintain relationships with amateur football clubs for the purpose of recruitment and development of talented players, as well as other (rival) amateur football clubs, which compete in various championship events. Notably, parishes and other religious institutions also play a role in providing safe spaces and resources for recreational football plays.

As summarised in Table 1 below, our identification and classification of the different stakeholders highlight the complex and dynamic stakeholder network of amateur football. In Step 2, the mapping of the relationships between those stakeholders will be analysed to comprehensively illustrate the value creation and distribution process in the grassroots football context.

Tab. 1: Grassroots Football Stakeholder Identification and Classification

Stakeholder Type	**Description**	**Responsibilities**	**Relationship Role**	**Relationship Type**	**Relationship Nature**
Owners and directors	Management and supervision of amateur football clubs	Strategic management and control	Primary	Direct	Formal
Players and staff	Athletes and technical and operational managers	Participation in technical training and competitions	Primary	Direct	Formal
Italian Football Federation (FIGC) - Lombardy	Regulatory body of regional football activities	Regulation and management of amateur football clubs	Primary	Direct	Formal
National Amateur Football League (LND)	Association of FIGC-affiliated clubs competing in championships	Management of competitions and championships	Primary	Direct	Formal
CSI/ANSPI/UISP	Amateur sport promotion bodies	Promotion of grassroots sports	Primary	Direct	Formal
Local sponsors	Business entities that help finance football clubs and their activities	Economic and financial support	Primary	Direct	Formal
Suppliers	Companies interested in football for commercial purposes	Supply of equipment and services	Primary	Direct	Formal
Family members	Parents and relatives of players	Financial and logistical support for athletes	Primary	Direct	Informal
Fans	Supporters interested and involved in football activities	Creating a collective social identity and common interest in football	Primary	Indirect	Informal
Local communities	Residents who benefit from sport-related activities	Sharing a social and cultural interest	Secondary	Indirect	Informal
Local institutions	Public bodies that help coordinate and support sport activities	Providing spaces, financing, and logistical support	Secondary	Direct	Formal
Schools and universities	Educational institutes involved in delivering sport-related activities or educational projects	Providing collaborative platforms for sport activities and academic training	Secondary	Indirect	Formal
Non-profit organisations and social associations	Entities that engage in community development initiatives	Supporting sport-for-development projects	Secondary	Direct	Formal
Mass media and journalists	Journalists and newspapers covering amateur football-related news	Disseminating and promoting football or other sport-related activities	Secondary	Indirect	Informal
Professional football clubs	Serie A, B, and C clubs that collaborate with amateur clubs	Providing partnerships to support youth and recruitment opportunities	Secondary	Direct	Formal
Other amateur football clubs	Other rival non-professional football clubs	Participating in local or regional competitions and enhancing the development and competitiveness of grassroots football	Secondary	Indirect	Informal
Parishes and other religious institutions	Entities that support football activities	Promoting social inclusion and cohesion through sport and providing resources and facilities	Secondary	Direct	Informal

Source: Authors' own work

Step 2: Relationship mapping (Preliminary findings)

The owners and directors of grassroots football clubs manage strategic and administrative decisions, directly influencing governance and resource management. The relationship between these actors and the clubs is direct and formal, affecting all operational aspects of the clubs. Likewise, players and staff are crucial to the functioning of the clubs, with a direct and formal relationship, considering their primary involvement in the clubs' sporting and

organisational activities. The FIGC and the LND regulate and supervise amateur football activities in a direct and formal relationship, ensuring standards of competition, sport training, and economic development of the clubs. Additionally, local sponsors play a key role in providing the financial support to partially sustain the clubs, so they have a direct and formal relationship with the clubs. Local institutions, such as municipalities and the region, provide logistical support and funding through a direct and formal relationship with the clubs. Schools and universities also take part in coordinating sport activities and academic training of young athletes, establishing an indirect and formal relationship with the clubs. Similarly, non-profit organisations and social associations also promote social development projects with a focus on football or other sport-related areas, thus enabling them to have a direct and formal relationship with the clubs. Media outlets and sport journalists amplify the visibility and popularity of grassroots football through an indirect and informal relationship with the clubs. The family members provide logistical and financial support to young athletes, so they have a direct and informal relationship with the clubs. Specifically, football fans and other local community members interact with the clubs through an indirect and informal relationship, contributing positive values to the sense of belonging and collective social identity. Finally, professional football clubs provide scouting opportunities and pathway programmes for young athletes affiliated with amateur clubs; thus, the two parties have a direct and formal relationship. Last but not least, parishes and other religious institutions also provide safe spaces and resources for football-related activities, establishing a direct and informal relationship with the clubs.

Overall, our analysis highlights the multi-faceted dynamics and complexities of the relationships between grassroots football clubs and their stakeholders, characterised by their direct vs. indirect and formal vs. informal interactions.

Step 3: Evaluation of the relationship values (Expected findings)

In Step 3, the theoretical evaluation of the relationship values embedded in the grassroots football stakeholder network and the dynamic interactions of the different stakeholders identified can be explicated in three value creation processes, namely (1) social and cultural value, (2) economic value, and (3) educational value. The social and cultural value emerges from the ability of clubs to emphasise the virtues of social cohesion and inclusion and a community sense of belonging. Whereas the economic value can be linked to the profitability of football activities and events conducted by clubs, sponsorships provided by sponsors or other commercial partners, and other economic factors associated with the local business environment and creation of job opportunities in the sport sector as a whole. Additionally, the educational value is derived from the role of clubs in transmitting and fostering sport-related knowledge, soft skills, and other conducts of intellectual and personal development to young athletes.

As this study is a work in progress, it is important to disclose that we are currently working on refining the classification and evaluation of the relationship values. The preliminary results have shown how the dynamic interactions between grassroots football clubs and local institutions generate a clear social and cultural value because the logistical and financial support provided by the municipalities can allow clubs to organise sport events and youth programmes, promoting the inclusion of vulnerable groups of the population and strengthening social cohesion. At the same time, with regard to collaborations with local sponsors, the creation of a significant economic value emerges, since they guarantee essential resources for the operational management of sports clubs and encourage the growth of the territorial economic sector through events and tournaments involving local businesses. The activity of amateur clubs, in this sense, represents a driving force for the local economy, increasing the visibility of partner companies and encouraging forms of investment in the sports sector. At the same time, the relationships between amateur clubs and schools confirm the presence of a strong educational and training value. Football is configured as a pedagogical tool that promotes the learning of fundamental values such as fair play, discipline and respect for the rules. Finally, the analysis of the dynamics with fans and local communities shows how amateur football generates social and cultural value through the construction of a collective identity around teams and clubs, transforming them into real territorial reference points. The active participation of the community, the sense of belonging and the emotional bond with the clubs represent a key factor for the sustainability of the amateur football system in the long term.

Research limitations. *This ongoing study also presents certain limitations to be considered. First, the study adopts a qualitative approach and utilises interview data. These factors may lead to a certain degree of subjectivity in the data interpretation process. Furthermore, the geographical focus on Italy at a regional level may limit the generalisability if and when other regions or countries with different sporting and socio-economic contexts are considered. Finally, the absence of longitudinal data may present a limited view of the complex value-creation process in grassroots football and its stakeholder network that is constantly evolving over time. Future studies should integrate these limitations by adopting quantitative approaches and expanding the scope of the current analysis.*

Managerial implications. *The preliminary findings of this study may offer insightful implications for sport managers and public institutions in the following manners. Concerning engagement strategies, grassroots football clubs can orient their stakeholder engagement strategies to be more inclusive and proactive by fostering and expanding relationships with different and more stakeholder groups, including but not limited to, players' family members, local community members, sponsors, and local institutions, etc. With regards to social inclusion policies, the local government can utilise the findings of the study to design more effective sport policies and further promote youth participation in football or other sport-related activities. The financial sustainability aspect is also crucial as having a proper understanding of the integrated value created through grassroots football in its stakeholder network can help amateur clubs obtain more visibility and attract public and private funding.*

Originality of the paper. *First, the interdisciplinary nature of this study allows an integrated perspective of multiple domains such as sport management, economics, and social network analysis and provides a in-depth analysis of the relevance and significance of grassroots football and its socio-cultural and economic impacts on local communities. Second, this study utilises and advances stakeholder theory and proposes a value-based perspective on the value creation process in the context of grassroots football and its multi-faceted stakeholder network. Third, this study adopts a three-step methodological approach that rigorously analyses not only the various relationships between stakeholders, but also the dynamics in which certain values are co-created by the concerned stakeholders involved. Finally, the study focuses on a specific geographical context, Lombardy (Italy) and provides an evidence-based analysis to characterise the salient features of the region's grassroots football system and its stakeholder ecosystem as a whole. The proposed framework is potentially replicable to help frame future studies that focus on other geographical settings or similar sporting contexts. Furthermore, this study also addresses an important gap in the existing literature raised by Torres-Pruñonosa et al. (2020) whose study calls for more empirical research on specific indicators and measurements of social value in sport.*

Key words: *Corporate social responsibility; Grassroots football; Stakeholder theory; Sustainability; Value creation*

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Track 14
Tourism & Culture Management

Smart Cities e Mega-Eventi tra Opportunità ed Elefanti Bianchi: L'Impatto della Finale UEFA Champions League sulla Digitalizzazione Urbana

FILIPPO MARCHESANI[1] GIUSEPPE CECI[2]

Abstract

I mega-eventi sono stati a lungo promossi come motori di sviluppo urbano, con la promessa di stimolare la crescita economica e accrescere il prestigio internazionale delle città ospitanti. Tuttavia, il dibattito sulla loro efficacia è ancora aperto, poiché i benefici attesi spesso si scontrano con costi elevati, dislocamenti urbani e impatti socio-economici controversi. In questo contesto, il concetto di smart city emerge come una risposta alle sfide della crescita urbana, sfruttando la tecnologia per migliorare la qualità della vita e rendere le città più efficienti e sostenibili. Nonostante il crescente interesse per le smart cities, la relazione tra mega-eventi e trasformazione digitale urbana rimane ancora poco esplorata. Questo studio si propone di analizzare in che modo i mega-eventi possano fungere da catalizzatori per la digitalizzazione delle città, con particolare attenzione ai servizi digitali, alle infrastrutture digitali e agli strumenti di comunicazione digitale. Attraverso l'analisi di 11 città europee che hanno ospitato la finale della UEFA Champions League tra il 2012 e il 2023, il lavoro esplora il ruolo di questi eventi nello sviluppo di nuove infrastrutture digitali e nell'adozione di tecnologie innovative. I risultati preliminari offrono un'interessante panoramica sull'evoluzione delle infrastrutture digitali, sollevando al contempo interrogativi su quanto i mega-eventi possano effettivamente promuovere lo sviluppo dei servizi digitali. Questo studio arricchisce la letteratura sulla digitalizzazione urbana, evidenziando il potenziale dei mega-eventi nell'accelerare l'innovazione tecnologica e il miglioramento delle infrastrutture cittadine. Dal punto di vista pratico, i risultati possono supportare policy maker e amministrazioni locali nell'identificare strategie per trasformare questi eventi in opportunità di crescita e sviluppo duraturo per le città ospitanti.

Inquadramento della ricerca. *Il concetto di "elefante bianco" è stato spesso utilizzato come metafora per descrivere beni o progetti imponenti ma poco funzionali, caratterizzati simultaneamente da costi di realizzazione e gestione elevati e benefici attesi limitati. Analizzata da una lente economica, la metafora dell'elefante bianco è stata impiegata da Robinson & Torvik (2005, p.198) per definire un progetto con un surplus sociale negativo. Radicato in questo concetto e nella letteratura economica, si colloca un tema ampiamente dibattuto sia da accademici che practitioners: il ruolo dei mega-eventi sullo sviluppo delle città. Storicamente, tale dibattito si è concentrato sulla complessa valutazione di sviluppo delle città ospitanti mega-eventi sportivi, come le Olimpiadi, il Super Bowl o la Coppa del Mondo FIFA[3]. Da un lato, questi eventi sono percepiti come strumenti di crescita economica e prestigio internazionale, oltre che occasioni importanti per attrarre e catalizzare fondi per la riqualificazione delle città e lo sviluppo di infrastrutture più efficienti (Preuss, 2007, 2018). Dall'altro, sempre più ricerche dimostrano come i costi effettivi superino di gran lunga i benefici attesi, portando a un generale scetticismo tra le comunità locali che spesso, oltre ad affrontare frequenti episodi di dislocamento, devono far fronte ad un aumento generale dell'inflazione e della criminalità (Gursoy et al., 2011; Ritchie et al., 2009; Winter et al., 2021). Per questi motivi, sebbene la letteratura che metta in relazione mega-eventi e città sia ben nutrita e si articoli su approfondite valutazioni sulle sue dimensioni economiche, politiche e sociali differenti, la ratio del nostro studio si colloca nella complessa ma inesplorata relazione tra mega-eventi e smart cities.*

Negli ultimi anni, il concetto di smart city si è sviluppato come una risposta alle sfide della crescita urbana, essendo esse stesse considerate e definite come sistemi urbani che sviluppano tecnologie per rispondere a bisogni sia economici che sociali, realizzando effetti tangibili in termini di benefici alla comunità (Eger, 2009). Sulla base di questa definizione, le smart cities dovrebbero essere capaci di rispondere in modo efficiente allo sviluppo delle tecnologie: tuttavia, il legame tra mega-eventi e trasformazione digitale delle città è ancora inesplorato (Marchesani & Masciarelli, 2025). In quest'ambito, i pochi studi esistenti affrontano il ruolo delle smart cities nella gestione operativa dei mega-eventi, come il controllo delle folle e la logistica urbana, ma il corrente sviluppo della letteratura è deficitario nell'esaminare come (e se) questi eventi possano rappresentare un volano per l'innovazione digitale. (Hefnawy et al., 2016).

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Tale lavoro si inserisce in un dibattito più ampio che coinvolge il futuro delle città e il loro adattamento alle trasformazioni tecnologiche. Le città che ospitano eventi di grande portata devono bilanciare lo sviluppo delle infrastrutture fisiche, sociali e digitali, evitando di creare infrastrutture obsolete e scarsamente utilizzate. Seguendo questa logica, il carattere "smart" delle città dovrebbe fungere come leva nel riuscire ad evitare la proliferazione massiccia di elefanti bianchi, ivi compresa la loro gestione e manutenzione. In questo contesto, il presente studio esamina il potenziale dei mega-eventi non solo come fonte di criticità economiche, ma anche come opportunità di trasformazione digitale per le città ospitanti proponendo due domande di ricerca: "Come le smart cities sfruttano l'impatto dei mega-eventi per avanzare nelle tecnologie digitali?" e "In che modo i mega-eventi influenzano le diverse dimensioni delle tecnologie digitali, come i servizi digitali, le infrastrutture digitali e la comunicazione digitale?".

Obbietivo della ricerca. *L'obbiettivo di questo studio è esplorare come le smart cities possano sfruttare i mega-eventi per accelerare la loro trasformazione digitale. In particolare, la ricerca si concentra sull'impatto che eventi sportivi di grande portata, come le Olimpiadi o la Coppa del Mondo, hanno su tre dimensioni fondamentali delle tecnologie digitali: i servizi digitali, le infrastrutture digitali e la comunicazione digitale.*

Nonostante la questione sia ancora poco esplorata nella letteratura accademica, numerosi studi dimostrano come i mega-eventi possano agire come catalizzatori per la digitalizzazione dei servizi urbani. In effetti, eventi di questa portata attraggono risorse economiche significative e stimolano l'adozione di soluzioni digitali da parte dei cittadini, delle imprese e delle amministrazioni locali. Ad esempio, durante le Olimpiadi di Tokyo 2020, le tecnologie digitali sono state utilizzate per promuovere un maggiore coinvolgimento dei cittadini, seguendo un approccio basato sull'economia collaborativa, che ha permesso di sviluppare soluzioni innovative per l'interazione sociale e la partecipazione cittadina (Kolotouchkina, 2018). Questo esempio dimostra come i mega-eventi possano servire non solo come terreno fertile per l'innovazione tecnologica, ma anche come "testing ground" per cogliere importanti opportunità di sviluppo per le smart cities.

Parallelamente, un altro aspetto cruciale riguarda lo sviluppo delle infrastrutture digitali. L'esigenza di gestire grandi afflussi di visitatori spinge le città a investire in reti di telecomunicazione avanzate, Wi-Fi pubblico e tecnologie IoT. Queste infrastrutture, sebbene "invisibili" e progettate principalmente per supportare gli eventi, tendono a rimanere attive anche dopo il termine degli stessi, contribuendo potenzialmente alla crescita e alla modernizzazione delle città. Ad esempio, molte delle reti di telecomunicazione sviluppate per le Olimpiadi di Londra 2012 e le recenti edizioni della Coppa del Mondo sono rimaste in funzione, supportando ulteriormente l'urbanizzazione e l'innovazione tecnologica nelle città ospitanti (Burchell, 2015; Hefnawy et al., 2016). Tuttavia, non mancano i rischi: c'è la possibilità che queste infrastrutture non vengano utilizzate a lungo termine, risultando in pericolosi "elefanti bianchi": costose da mantenere e talvolta inefficaci se non adeguatamente integrate nel contesto urbano. Questo solleva preoccupazioni legate alla sostenibilità e all'ottimizzazione delle risorse investite (Preuss, 2018; Wu et al., 2016).

Infine, la letteratura ha dimostrato come i mega-eventi hanno un impatto significativo anche sulla comunicazione digitale delle città ospitanti. Questi eventi globali offrono un'opportunità unica per aumentare la visibilità internazionale delle città, grazie alla diffusione delle immagini e delle informazioni tramite i social media e le piattaforme digitali. Tuttavia, tale effetto sembra essere ambivalente e meno netto: mentre l'impatto comunicativo è evidente durante l'evento stesso, è stato osservato che la visibilità tende a diminuire nel tempo, una volta che l'evento è concluso (Kassens-Noor et al., 2019; Knott et al., 2015; Molinillo et al., 2019).

Sula base di questo discorso proponiamo le seguenti tre ipotesi:

H1: Ospitare mega-eventi influenza positivamente la sviluppo di servizi digitali nelle smart cities;

H2: Ospitare mega-eventi influenza positivamente lo sviluppo di infrastrutture digitali nelle smart cities;

H3: Ospitare mega-eventi influenza positivamente lo sviluppo di strumenti di comunicazione digitale nelle smart cities.

Per rispondere alle nostre domande di ricerca e testare le nostre ipotesi, tale studio propone un'analisi empirica di undici città europee che hanno ospitato la finale della UEFA[4] Champions League tra il 2012 e il 2023. L'obiettivo è analizzare l'impatto di questi eventi come stimolo esogeno per l'innovazione tecnologica urbana. In particolare, si adotta un approccio dinamico che risponde alla crescente necessità di studi longitudinali e comparativi sui mega-eventi, al fine di comprendere come le città rispondano agli input esterni e come questi eventi possano contribuire alla loro trasformazione digitale (Müller et al., 2022; Schulenkorf et al., 2024).

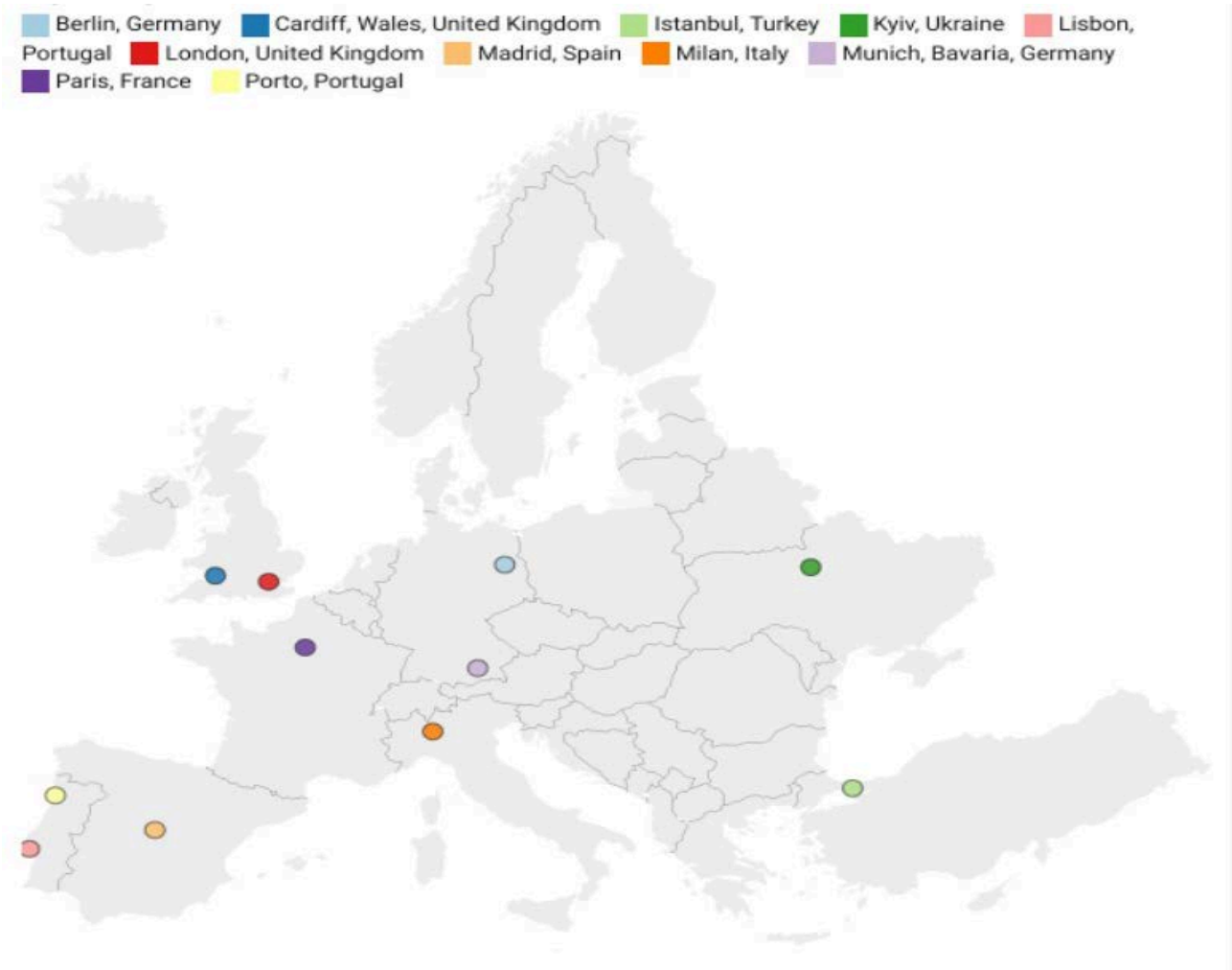
Dal punto di vista teorico, il contributo di questo studio si sviluppa su tre direttrici principali. In primo luogo, amplia il dibattito sull'implementazione delle tecnologie digitali nelle smart cities, esplorando il ruolo dei mega-eventi nell'influenzare tale sviluppo tecnologico (Albino et al., 2015; Marchesani, 2023).In secondo luogo, contribuisce alla letteratura sugli impatti urbani dei mega-eventi, approfondendo il loro potenziale trasformativo e le opportunità di efficientamento delle infrastrutture (Müller, 2015; Preuss, 2018). In terzo luogo, si inserisce nel filone di ricerca che esamina la relazione tra innovazione digitale e trasformazione urbana, valutando se i mega-eventi siano effettivi catalizzatori di innovazione o se, al contrario, rappresentino solo generatori di infrastrutture scarsamente utilizzate ed estremamente costose per la città (Safarov, 2021; Sorri et al., 2024).

[4] Union of European Football Association, letteralmente "Unioni delle federazioni calcistiche europee"

Metodologia. *Il presente studio utilizza un dataset longitudinale che comprende dati primari, raccolti tramite il Wayback Archive, e dati secondari provenienti da fonti nazionali e internazionali. L'analisi si concentra su 11 città europee che hanno ospitato la finale di Champions League tra il 2012 e il 2023. Le 11 città costituiscono un contesto ideale per esplorare l'evoluzione digitale urbana ricalcando la logica con cui viene attualmente valutata l'implementazione di tecnologie nelle smart cities nella letteratura corrente (Hajduk, 2018; Kummitha, 2018; Marchesani & Ceci, 2025).*

Inoltre, tutte le città comprese nell'analisi possono essere considerate smart cities (Fig.1) in quanto stanno affrontando diversi percorsi di trasformazione digitale, implementando tecnologie avanzate per migliorare la qualità della vita dei cittadini, l'efficienza dei servizi digitali, infrastrutture digitali e la comunicazione digitale (Unione Europea, 2014[5]; Istanbul Metropolitan Municipality, 2021[6]; World Cities Culture Forum[7]).

Fig. 1: Città Ospitanti le finali di Champions League (2012-2023)



Fonte: Elaborazione degli autori

Il modello considera tre variabili dipendenti: Servizi Digitali, Infrastrutture Digitali e Comunicazione Digitale. La variabile Servizi Digitali misura il numero di servizi online forniti dai siti web municipali tra il 2012 e il 2023, analizzati retrospettivamente tramite il Wayback Machine, con categorizzazione standardizzata e dati normalizzati su una scala da 0 a 1 per garantire comparabilità. La variabile Infrastrutture Digitali combina due indicatori chiave: il numero di hotspot Wi-Fi pubblici e l'investimento annuo in infrastrutture Wi-Fi, normalizzati tramite z-score o min-max scaling e aggregati attraverso l'utilizzo della Analisi per Componenti Principali (PCA). La variabile Comunicazione Digitale valuta l'adozione di piattaforme social da parte delle città (Twitter, Facebook, Instagram, LinkedIn, Telegram e TikTok), con presenza codificata binariamente e analizzata tramite l'Indice di Herfindahl-Hirschman (HHI) per misurare la

[5] Fonte: https://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOL-ITRE_ET(2014)507480_EN.pdf (Pagina39)
[6] Fonte: https://www.akillisehir.istanbul/en/hakkimizda/
[7] Fonte: https://worldcitiescultureforum.com/city-project/kyiv-digital/

diversificazione delle strategie di comunicazione digitale. L'evento oggetto di studio è la finale di Champions League, trattata come variabile binaria (0 per gli anni precedenti, 1 per l'anno dell'evento e quelli successivi).

Il modello adotta un approccio difference-in-time per valutare l'impatto pre e post-evento controllando gli effetti specifici di ogni città e conducendo test di robustezza su città che hanno ospitato più finali. Per isolare il ruolo della digitalizzazione urbana, sono inclusi fattori economici e urbani, come investimenti in R&D, PIL, popolazione, classificazione UE per dimensione e sviluppo urbano, turismo e flussi aeroportuali. L'analisi utilizza un modello a effetti fissi su dati panel (144 osservazioni) per controllare l'eterogeneità non osservabile tra le città (Hong et al., 2023; Su & Ju, 2018). Abbiamo quindi incluso effetti fissi per anno e città, con standard errors clusterizzati per gestire eteroschedasticità e correlazione seriale. Sono stati condotti placebo test, il test di Hausman, la stima di Arellano-Bond per l'endogeneità e il controllo della multicollinearità (VIF), che confermano la validità del modello nel valutare l'impatto della finale di Champions League sulla digitalizzazione urbana.

Risultati attesi. *I risultati preliminari evidenziano la complessità nella relazione tra Mega-Eventi e Smart city evidenziando come, sebbene vi sia un effetto positivo sulla digitalizzazione delle città, questo differisce in base alla struttura digitale analizzata. In particolare, sulla base del nostro panel e dalle prime valutazioni, possiamo anticipare che le città che hanno ospitato la finale di Champions League tra il 2012 e il 2023 hanno visto un'accelerazione nei processi di digitalizzazione urbana. Dai primi riscontri possiamo notare un incremento significativo per quanto concerne più specificatamente le infrastrutture digitali, confermando quanto i mega-eventi possono essere davvero catalizzatori nello sviluppo di infrastrutture (Burchell, 2015; Hefnawy et al., 2016) . In tal senso, la nostra analisi preliminare sulle infrastrutture digitali fotografa un aumento generale del numero di hotspot Wi-Fi pubblici e un incremento degli investimenti in connettività, probabilmente dovuti sia alla necessità di supportare l'elevato afflusso turistico sia a strategie di lungo termine delle amministrazioni locali che vedono nei mega-eventi un'occasione preziosa per consolidare il progresso tecnologico maturato. Anche la comunicazione digitale potrebbe aver subito una trasformazione, con un uso più diversificato e strategico delle piattaforme social da parte delle città ospitanti pre e post-evento.*

Questo fenomeno potrebbe derivare dalla volontà di promuovere l'evento, gestire i flussi di visitatori e consolidare un'immagine di città innovativa e connessa a livello internazionale. In questo contesto, i mega-eventi possono fungere da vere e proprie leve per accrescere e rafforzare non solo l'immagine della città per i propri residenti ma anche per potenziali nuovi entranti (sotto forma di nuovi residenti, aziende o turisti nazionali ed internazionali). Infine, non ci immaginiamo un aumento sostanziale dell'implementazione dei servizi digitali. In effetti, nonostante il dibattito corrente che mette in risalto come i mega-eventi possano essere una leva per stimolare l'innovazione tecnologica, anche grazie al coinvolgimento di cittadini in questo processo di innovazione collaborativa (Kolotouchkina, 2018; Mason et al., 2024) riteniamo che i mega-eventi, per quanto possano rappresentare veri e propri shock per le città ospitanti in termini di aumento di risorse, investimenti, attrattività e creazione di nuove infrastrutture, non riescano a fungere da catalizzatori nella creazione di servizi digitali. In tal senso, riteniamo che i servizi digitali seguono percorsi di implementazione tecnologica con logiche top-down che i mega-eventi non riescono a smussare nonostante la loro portata e i benefici che ne conseguono.

Limitazioni della ricerca. *Nonostante la robustezza metodologica del modello adottato, la ricerca presenta alcune limitazioni. In primo luogo, l'uso di dati storici provenienti dal Wayback Archive potrebbe non catturare pienamente le modifiche implementate nei siti web municipali, specialmente nei casi in cui le amministrazioni abbiano archiviato non correttamente alcune delle informazioni o nel caso in cui non le abbiano tempestivamente aggiornate. Inoltre, la variabile indipendente binaria, che considera solo la presenza o assenza dell'evento, potrebbe non cogliere la variabilità nei livelli di investimento in digitalizzazione tra le diverse città ospitanti. Alcune città potrebbero aver già intrapreso strategie di innovazione digitale indipendentemente dal singolo evento della finale di Champions League, rendendo difficile attribuire con certezza gli effetti osservati all'evento stesso. Un'ulteriore limitazione riguarda la generalizzabilità dei risultati: sebbene lo studio si concentri su città europee con caratteristiche socioeconomiche relativamente simili, i risultati potrebbero non essere estesi a contesti con dinamiche di sviluppo urbano differenti, come città di paesi in via di sviluppo o con limitata possibilità di accedere a fondi per lo sviluppo e la riqualificazione urbana. Infine, il periodo di osservazione, pur coprendo un arco temporale di oltre un decennio, potrebbe non essere sufficiente per valutare appieno gli effetti di lungo termine della digitalizzazione urbana post-evento.*

Implicazioni manageriali. *I risultati attesi suggeriscono diverse implicazioni per policy maker e amministratori urbani. In primo luogo, le città che ospitano eventi di grande rilevanza internazionale dovrebbero considerare tali occasioni come opportunità per accelerare lo sviluppo delle infrastrutture digitali e migliorare i servizi offerti ai cittadini e ai visitatori. La possibilità di usufruire della portata di tali eventi permette alle città di investire e testare nuove tecnologie su grande scala per poter rispondere in modo più efficiente ai repentini cambiamenti della popolazione dovuti non solo a flussi di turismo internazionale - come nel caso della finale di UEFA Champions League - ma anche a flussi di turismo nazionale dovuti a eventi simili - come nel caso di eventi sportivi di campionati nazionali. In tal senso, il miglioramento delle infrastrutture digitali permette ai governi locali di poter mitigare fenomeni di sovraffollamento, traffico e congestionamento che interessano le smart cities durante i mega-eventi. Nello specifico, gli investimenti in Wi-Fi pubblico e in piattaforme digitali potrebbero non solo rispondere alle esigenze dell'evento, ma anche generare benefici a lungo termine, favorendo la transizione verso modelli di smart city più avanzati e responsivi.*

Inoltre, la gestione strategica della comunicazione digitale si rivela un fattore chiave: le amministrazioni pubbliche dovrebbero adottare un approccio integrato, sfruttando le diverse piattaforme social per interagire con la cittadinanza e rafforzare la propria immagine. In tal senso, lo sviluppo di strumenti per la comunicazione digitale diventa un fattore

cruciale a beneficio sia delle comunità locali, tramite un miglioramento dei servizi per la diffusione di informazioni utili e aggiornate in tempo reale, ma anche per potenziali turisti, visitatori o aziende. In quest'ottica, lo sviluppo di piattaforme di comunicazione digitale diventa una vetrina per le città favorendo la crescita delle attività economiche, l'attrazione di nuovi eventi e il rafforzamento della loro competitività nel panorama turistico e commerciale. Infine, la nostra ricerca evidenzia anche l'importanza della pianificazione post-evento: una volta terminato l'evento, le città dovrebbero continuare a investire nella digitalizzazione per evitare un ritorno ai livelli preesistenti e consolidare i progressi raggiunti. Con ciò non si auspica a una costosa manutenzione degli "elefanti bianchi" quanto ad un consolidamento del progresso tecnologico maturato, cucito sulle esigenze specifiche e prospettiche della città. Infine, gli sponsor e gli attori del settore privato coinvolti nell'organizzazione dell'evento potrebbero trarre vantaggio dalla creazione di partenariati con le amministrazioni locali per promuovere soluzioni tecnologiche innovative e sostenibili.

Originalità dell'articolo. *Questo studio contribuisce alla letteratura esistente sulla digitalizzazione urbana e sugli impatti economici e sociali dei mega-eventi, introducendo un'analisi empirica comparativa dettagliata basata su un dataset longitudinale. L'uso del Wayback Archive per tracciare l'evoluzione dei servizi digitali municipali rappresenta un approccio innovativo che consente di superare le limitazioni dei dataset tradizionali. Inoltre, la combinazione di indicatori di infrastrutture digitali e strategie di comunicazione permette di ottenere una visione più completa della trasformazione digitale delle città ospitanti. L'approccio econometrico adottato, con l'integrazione di un modello a effetti fissi e test di robustezza avanzati, garantisce una maggiore affidabilità dei risultati, contribuendo al dibattito accademico sull'efficacia degli eventi sportivi come catalizzatori di innovazione urbana. Infine, il lavoro si distingue per la sua duplice rilevanza sia teorica che pratica.*

Dal punto di vista teorico, è il primo lavoro che analizza lo sviluppo tecnologico delle smart cities dalla lente dei mega-eventi, aprendo interessanti orizzonti di ricerca su queste tematiche. Dal punto di vista pratico offre indicazioni utili non solo per la comunità scientifica, ma anche per policy maker, amministratori locali e aziende interessate a comprendere le dinamiche della digitalizzazione urbana e le opportunità offerte dai mega-eventi internazionali. In tal senso, organizzazioni come la UEFA o la FIFA possono utilizzare i mega-eventi come leve per co-creare ed innovare insieme alle città ospitanti.

Parole chiave: *mega-eventi; smart cities; servizi digitali; infrastrutture digitali; comunicazione digitale; elefante bianco*

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Festivals' long-term benefits to a host destination: the challenge to adopt a legacy perspective

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Abstract

Cultural events and festivals are a key component of the tourism sector, influencing both the cultural identity of local communities and their economic vitality, while offering visitors unique experiences that foster long-term benefits and community development. Although much of the research on event tourism focuses on economic impacts, recent studies have expanded the scope to include long-lasting effects.

This paper addresses a gap in the literature by exploring the long-term benefits of cultural events, specifically considering the legacy they can leave on local development. The research aims to apply the legacy concept—widely studied in the context of mega-events and sport events like the Olympics—to festivals, proposing they can play a significant role in community development and placemaking through their contribution in social cohesion, community well-being, and cultural preservation.

The Treviso Festival network in Italy is considered, due to its variety and relevance at both a local and national level. Through semi-structured interviews with festival founders and organizers, the study will assess the long-term benefits of Festivals. The collected data will be analysed using Atlasti tool.

By incorporating a strategic long-term perspective, the research advocates for a holistic managerial approach to cultural event planning that recognizes the importance of community-driven development and heritage preservation.

The study will also provide a contribution to the empirical literature on the legacy applying it to the cultural context, offering valuable insights for cultural managers to leverage Festivals' effects in the long run.

Framing of the research. *Cultural events and Festivals play a key role in shaping the world's cultural tourism landscape becoming important drivers, offering unique experiences that attract people while shaping the identity and vitality of local communities (Lopes and Hiray, 2024). Much of the literature studying event and festival benefits builds on the early work in the area of event tourism, in which Getz (2005), Ritchie (1984b) and Hall (1992) are the most often cited authors. It must be noted that, despite the growth and popularity of Festivals and special events, researchers have been very slow in directing their studies beyond economic impacts (Gursoy et al., 2004). There is evidence to suggest that, only in recent years, such a broader perspective has come to be adopted, identifying a variety of potential effects, including social, cultural, political, physical and environmental ones in the long run. The concept of legacy seen as the planning effort to confer long-term benefits to a host destination (Hartman and Zandberg, 2015) and to be distinguished from the word "impact" which is caused by a short-term impulse to the economy as an outcome directly connected to an event (Thomson et al., 2019), has mostly been applied to large scale events and specifically sporting ones (Langen and Garcia, 2009). While legacy studies have not been specifically designed to provide evalutaions in the cultural context, cultural events and Festivals are able to provide long lasting effects to a territory contributing by attracting visitors, increasing spending on lodging, food, transportation, and shopping, and providing cash for local companies. Furthermore, they generate job opportunities and encourage investment in tourism infrastructure. Being also vital in conserving and promoting cultural history, customs, and identity. In fact, cultural events and Festivals increase community participation, capacity building, improving social cohesion, pride, and identity within the community (Lopes and Hiray, 2024).*

Cultural events and Festival: value in the current tourism field

Events are one of the ways in which the community can find an opportunity to meet, share, be proud, develop cohesion and experience different cultures (Grassi, 2023). In the past, events were arranged to celebrate a specific happening, now they may be presented in order to meet specific objectives with the emphasis on attracting more visitors and the expenditure associated with them.

Main benefits or objectives of events can be listed as follows (Saayman and Saayman, 2006):

- *Increased community pride and spirit;*
- *Strengthening of traditions and values;*

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- *Greater participation related to the theme of the event;*
- *Adaptation of new social patterns or cultural forms through exposure at the event;*
- *Marketing benefits, which include branding and creation of a positive image;*
- *Increased volunteerism and community group activity;*
- *Intercultural interaction and co-operation;*
- *Economic benefits.*

Several authors (Miles and Green, 2008, Stoneman, 2015) have suggested that, the cultural context has some differences if compared to other industries or service provision models; furthermore, when dealing with the innovation process related to the creative industries it is noticed that it requires particular and detailed investigation (Salvador and Pedersen, 2022) having often been analyzed in terms of specific subsectors, such as art restoration, music, archaeology companies, book publishing and museums. A particular creative industry case is cultural Festivals (music, cinema, etc.), which are classified as events and, due to their singularity, are analyzed from the perspectives of their management (Getz, 2008), the degree of uncertainty (Rüling and Pedersen, 2010) and their social impact (Del Barrio et al., 2012).

Getz (2005) defines Festivals as public celebrations with a special theme, while Smith (2015) defines them as special events or themed celebrations open to public and organized annually or more rarely. Festivals can be understood as periodically recurrent, social and open occasions that last for several days and contain a series of coordinated events with a theme that is culturally significant for the local (Getz, 2010); being meant as an important attraction for tourism destinations (Cudny and Cudny, 2016). The growth in the number of Festivals means that the festival sector has increased in economic and cultural significance and it also means that there is greater competition to attract a large enough audience to secure the necessary benefits linked to it (Knardal and Bjørnenak, 2020).

A precise measurement of the long term value generated by a cultural event such as a festival offers arguments about the contribution of culture to society and the economy. In fact, Festivals provide the opportunity for locals to preserve their culture and history through art, crafts and performances (Yozukmaz et al., 2020). At the same time, they attract foreigners to their destination of which they present customs and traditions (Long et al., 2004). But as Goldblatt, Getz, Hall (2002, 1997, 1992) argue, the festival organisers and local governments seem only to take into account the economic impacts ignoring the other huge implications especially forgetting to adopt a long term perspective.

Cultural events and Festival: benefits measurement

Festivals play a major role in culture-led development. However, the way the value of the creative industries (including Festivals) is assessed is skewed toward economic impact studies (Safari et al., 2021) or socio-economic ones (Attanasi et al., 2013). The purpose of an economic impact analysis is to measure the economic benefits that accrue to a community (Saayman and Saayman, 2004). According to Getz (1997) economic impact assessments often includes a multiplier calculation to demonstrate that incremental tourist expenditure has direct, indirect and induced benefits for the local economy. These economic-centric approaches to the evaluation of arts and culture are in contrast to the "ecosystem" view of cultural events that highlights the interdependencies between economic, social, and cultural outcomes (Jeffcutt, 2004, Holden, 2004). Events have long been viewed as only a tool for economic development (Saayman, 2012), while, since the early 2000s, it has been understood that events can provide the impetus for the transformation of host cities. These events offer opportunities for changes to the tangible and intangible or material and symbolic - characteristics of cities through, for example, regenerating downtown areas, upgrading public infrastructure, and enhancing or altering a city's image (Cantillon, 2022). There is today a growing number of studies dedicated to developing tools to measure all the impacts of Festivals as the one of Fredline, Jago et al. (2003) who documented the processes involved in developing a scale to be used in assessing the social impacts of three different events. Hall (1992), from the very beginning of his studies, had argued that, looking at events and specifically Festivals, environmental, socio cultural and political effects are probably more important than economic ones, but have tended to be ignored because they are hard to be quantifiable.

Festivals, both in the pre and post-event stages, can offer a range of opportunities, and the bundling of planned activities should be combined with local services, capabilities and capacity within the region's supply chain (Chalip, 2004). Doing so can retain festival expenditure inside the destination creating strategic convergence between the characteristics of a focal event and the ways a destination wishes to portray its "distinctive" brand producing tangible benefits for both city and festival stakeholders. As Chalip's (2004) proposes, developing the features and images of the event and incorporating them into the destination's overall marketing mix is the natural outcome of such strategic convergence. Hamilton et al. (2008), represent one rare example in which an evaluation on a cultural event is made (of the Highland Year of Culture) focusing on economic, social and cultural impacts before, during and after the festival year, using a range of qualitative and quantitative methods.

Event Legacy as a long term perspective: from mega events to Festivals

Due to the wide range of benefits an event can provide, the interest in the so-called event legacies specifically linked to mega events or mega sport events has grown exponentially, and has become central to the rhetoric and practice of event committees, event governing bodies, and host governments (Thomson et al., 2013).

Mega-events can be defined as "high-profile phenomena associated with prestige and global visibility that frequently cause large-scale transformations of cities and regions through their legacies" (Kassens-Noor et al., 2015). More broadly, sport mega-events are a type of "hallmark event" which "provides the host community with an opportunity to secure high prominence in the tourism market place" (Hall, 1992). They have been one of the fastest

growing segments of the tourism industry, with cities and countries vigorously competing to host such events (Zarotis, 2021).

Legacy is used to refer to the effects before, during, and after an event on a host destination. Legacies can be classified in different ways (Hartman and Zandberg, 2015). One of the earlier articles to consider event legacies outlined that "part of the justification for enormous capital investment in events is the promise of legacy for the host community or nation" (Gets, 1991). Over the last 2 decades, event legacies definitions have been rationalized behind the longer term perspective (Girginov and Hills, 2013). A further discussion concerns the temporal aspect. Some authors define legacy as a set of "permanent" consequences, while others "as a set of long-lasting effects." A further perspective argues, however, that legacy can include both short-term and long-term consequences. Getz (1991, 2005) for example, defines legacy as a set of permanently conferred benefits. Hiller (2000) also defines legacy as "(a set of) permanent improvements on the surrounding environment." Chappelet (2003), on the other hand, defines it as a long-term impact, and McCloy (2003), in a more narrowly sporting context, refers to legacy as "a long-term use of sports equipment." Another widely debated issue concerns when legacy occurs. Indeed, scholars are asking whether these occurs before, during or after the event. McCloy (2003), for example, defines them exclusively as a post-event consequence. Chalip (2003), on the other hand, analyzing the field of tourism, argues that tourism visits that occur before the event itself should also be considered legacy. Roche (2003) and Barney (2003) highlight how the symbolic value of the Olympics and its commercial potential are not limited to a specific point in time, but represent something that organizers must manage before, during and after the event.

Preuss (2007) focused and defined legacies in sport mega event as the "planned and unplanned, positive and negative, tangible and intangible structures created for and by a sport event that remain longer than the event itself". He also identified six elements through with to explain it: infrastructure, know-how, networks, culture, emotions, and image. Moreover, Chappelet (2012) pointed out that legacies may be planned and top-down implemented such as enhanced infrastructure and mobility. Legacies could also be unplanned and emerge from the bottom-up, such as positive and negative emotions towards an event and its impacts. Yet, the unplanned side of legacy and its delivery is rarely acknowledged in research on legacy, in fact the issue is still at the center of the academic debate but as Thomson et al. (2013) point out, most of the publications that support the idea that legacies are a consequence of strategic planning are recent.

Furthermore, literature on event planning, legacy planning, and impact studies of mega events can be distinguished as a positive legacy (critical success factors) and factors that are related to a negative legacy (failure factors). By doing so, it is possible to discuss the relationships between legacies and planning strategies. The legacy of an event has direct effects such as spatial/physical, economic and social-cultural as well as indirect effects such as image, branding and urban recognition. Policies, culture, social structure and economic power that dominate the city have a decisive role in the legacy of activities. In this sense, each host area shapes its event legacy and determines whether the sustainability of event venues is ensured or not. More recently, Allen et al. (2022) highlighted the increased importance of legacy within the event management context, noting that for some events, the issue of legacy has become central to the decision to host or create them.

Although economic mega event impacts are strong, they are short-term and therefore not a legacy. Researchers and policy makers have called for a longer term focus and a more comprehensive evaluation of outcomes which are included in the notion of legacy (Thomson et al., 2013). The legacy, is all additional post-event value (Thomson et al., 2019). A frequently highlighted aspect is the need to develop this long-term perspective, whereby an event is embedded in a larger pre and post event development programme. For instance, organizing side events prior, during, and after the main mega event. Alternatively, an event can be used as a catalyst to encourage youth to participate in sports, for urban redevelopment, or to enhance infrastructure (Ritchie, 2000). These aspects implicitly articulate the need for a focus that goes beyond economic factors, and includes social, community, and education objectives (Smith, 2014). Post-event planning includes keeping the memory of an event alive, through a legacy (Chappelet, 2012).

Lately, attention for the legacy of events has grown substantially and the literature review brings to the conclusion that legacies are likely to be multifaceted because benefits can range from political, infrastructural, temporal and place specific (Whitson and Horne, 2006).

Since Festivals are now considered as critical issues in the current tourism field, by determining interactions between local people and guests as an element of tourism experience (Intason, 2024), this research proposes to apply the theoretical and managerial implications of sport meta-events legacies to Festivals, specifically considering the distinct characteristics of cultic events compared to sports events.

Purpose of the paper. *Many studies focus on the short-term economic benefits of cultural events on tourism, such as immediate revenue generation. In respect of culture as a means of regeneration there are policy documents which allude to a long-term and sustainable legacy left by festivals. However, while there is agreement that they have the potential to offer long and positive benefits (Arcodia and Whitford, 2007, Tucker and Property, 2008) there is rarely clear guidance as to how this will be determined or measured in the policies that accompany festival-development projects. Furthermore, the focus has tended to be on either specific pieces of legacy or an incomplete selection of legacies, and the concept of legacy has often been confused with leveraging, sustainability or even impacts. To attempt to reduce the confusion, and fill the gap, this paper would like to understand the long-term benefits of Festivals on destination development, community*

well-being, and cultural preservation. The overall purpose of this research is to explore if and how the legacy of mega-events can be applied to Festivals to analyze their long-term role in promoting local development.

The framework proposed by Robertson (2009) and made of the following six key themes: festivals and policy; stakeholders and contested meaning; social impacts and social impact measurement scales; community and networks; community and social capital; and festival directors, has been identified for further exploration. These themes are used in this work to critically reflect on Festivals in the light of some specific considerations emerged in literature such as: (a) bestowed or planned; (b) temporal or continuous (c) local or global (Thomson et al., 2009); (d) type of topic/content and (e) age of the event.

The paper will also identify new legacy dimensions specifically applicable to the cultural context and Festivals.

Starting from the proposed framework, the authors would like to understand (1) which are the possible long-term effects that can be referred to Festivals; (b) what are the conditions under which these long-term benefits emerge; (c) if and how effects vary depending on the festival typology and content in order to properly explain what levers need to be implemented to foster them.

The strength of the study lies in demonstrating how a legacy framework—adapted from mega-events—can be operationalised in smaller-scale, recurring cultural contexts by showing what aspects of existing legacy models are being confirmed, challenged, or extended. This perspective provides a way to leverage the Festival delivery to achieve outcomes which go far beyond the immediate economic ones. This will emphasize the significant role that Festivals can play in contributing to placemaking and generating well-being within communities with a specific focus on long-term benefits.

Managerially, the paper offers practical guidance on how to design and manage festivals with long-term community impact in mind.

Methodology. *This research project starts from a medium-long term reflection on how it is becoming increasingly important to be able to maximize the positive effects over time deriving from a cultural event. Noticing that in event evaluation, traditionally only short-term impacts (mostly economic) are measured and analyzed. In order to perform the study, a qualitative approach is adopted because, compared to the quantitative research methods, the focus is on a small number of subjects, from which a substantial amount of information is obtained. Semi-structured interviews are conducted as they represent a powerful qualitative research method (Gallata, 2013) to obtain an in-depth understanding of the dynamics of Festivals planning and measurements, representing the best option for the present paper as already explained by Denyer and Tranfield (2006) and Dixon-Woods et al. (2006) who reflected on the growing recognition of the capacity for qualitative studies to inform policy and practice. Through this methodology it is possible to address a series of key questions, bringing up new ideas during the interview. In fact, semi-structured interview are informal, use open-ended questions, let the interviewees talk without interrupting them, and allow follow-up questions. Interviews are mostly organized face-to-face, when possible, but also online ones have been scheduled (according to the interviewed needs) since they are now accepted as a valid and trustworthy alternatives to traditional in presence interviews (Saarijärvi and Bratt, 2021).*

Semi-structured interviews, as the name implies, need to be pre-planned and well prepared, since the interviewers (the authors in our case) need a guide made of general questions related to the research topic (Hancock et al., 2001). The first step is to develop the interview guide which in this case allows to:

- *reflect on the long-term benefits identified through the literature review: social, cultural, physical, tourist, psychological, political (Brent Ritchie, 1984a, Hall, 1992, Fredline et al., 2003, Jeon et al., 2016);*
- *deepen the understanding of long-term benefits of cultural events on (1) destination development, (2) community well-being, and (3) cultural preservation;*
- *explore the difference in terms of effects, between one-time events or recurring events taking place on a regular basis (as Festivals);*
- *divide the effects on those directly involved in the cultural event and on the indirect stakeholders;*
- *understand the role that components such as tradition, innovation already explored in previous researches both at a general level in cultural contexts (Salvador and Pedersen, 2022) or applied to specific realities such as the Italian Albergo Diffuso form of accommodation (Presenza et al., 2019) can play in fostering a legacy.*

The Treviso Festival network (made of 16 well-established Festivals) is considered since it has gained the visibility, credibility and favor of the public. In fact, it is meant as a "Festival of Festivals" that (a) represents a true excellence in the Italian scene, testified by the fact that most festivals have been taking place for several years now, (b) the network is in continuous evolution and expansion, (c) the network spans multiple areas of culture and knowledge: from literature to sustainable development, from cinema to music, from computer science to comics, from statistics to knowledge of other cultures, from philosophy to theater and visual arts.

For each Festival the founder is identified as the key informant to be interviewed. Stakeholder analysis and most particularly the stakeholder group made of festival directors and festival organizers are highly relevant since they have great significance in determining the relationship of the festival with the local community (Gursoy et al., 2004).

Each interviews lasts between one hour and one hour and a half. The two researchers apply an inductive and deductive processes by putting together the results of previous works and new emerging topics to identify festival activity that will enhance (rather than diminish) their long term effects. Basically, an aggregation of the literature and the central issues that have been repeated within the interviews are identified and assessed for each festival of the network. The qualitative data coming from interviews is analysed using ATLAS.ti tool. The acronym, CAQDAS (Computer Assisted Qualitative Data AnalysiS), refers to software created to aid qualitative data analysis (Friese, Soratto et al. 2018). The software

ATLAS.ti is an example of CAQDAS, which has already been used by many researchers from different fields of knowledge (Flick 2009; Friese 2014). This tool is shown to be a promising strategy for conducting qualitative analysis (Vila-Henninger, 2019, Celia Maria Ronzani et al., 2020). The researchers have worked collaboratively to identify recurring patterns and themes in the data related to the analysed phenomenon. This involved first reading through all the data, making notes using the comments and memos features and planning an initial coding scheme. Then these codes are combined into descriptive themes and quotes are retrieved for each theme. Quotations for each theme help to identify the main findings of the work.

Results. *This research aims to uncover the long-term benefits that Festivals can bring to local communities, cultural preservation, and destination development, extending far beyond the immediate economic advantages typically associated with such events. The study is able to identify and highlight key long-term effects, such as social cohesion, cultural enrichment, sustainable tourism, and improvements in community well-being, which are often overlooked in traditional event evaluations. The findings demonstrate how the concept of legacy can be applied not only to mega events and sport events but also to the cultural context, providing a deep understanding of what is happening in Festivals.*

Insights come from the interviews done involving festival founders and directors' since their perceptions have already been identified as valuable in the development of the body of knowledge in relation to festival evaluation.

Looking at Robertson's 6 key themes (2009), it is possible to emphasize both the general political dimension in terms of support and sponsorship (policy) and the network relevance in terms of synergies. Also the human capital role and how differences occur according to the Festival type becomes a relevant result to be further investigated.

In addition a highly discussed topic in legacy literature, is the role of infrastructures left by a big (sport) event (Preuss et al., 2021). For Festivals the situation is exactly the opposite: it is not the event which creates new facilities and buildings on a territory (where the real legacy value would come from its use over time after the mega event), but the Festival itself uses existing (historical) buildings to exploit them, and creates new ways of usage and the involvement of new targets of visitors.

This research, by seeking to highlight the potential of Festivals, serves as powerful tools for long-term urban, social, and cultural development, providing valuable guidance for future policy-making and event planning strategies.

Research limitations. *The focus on a single city and its festival network represents a limitation. The inclusion of multiple cities or diverse festival networks in future studies could provide a more comprehensive understanding of the legacy phenomenon in cultural studies. Additionally, conducting interviews with individuals directly involved in event planning may introduce researcher bias. Since the interviewees are closely connected to the festivals, their responses might be influenced by their personal views or interests, leading them to provide answers that they perceive as more favorable to themselves. To mitigate this potential bias, future research should include a wider range of participants, such as attendees or community members directly engaged in the festivals. Expanding the scope of informants beyond founders and organisers, would allow for a more balanced perspective, offering insights into how the events are experienced and perceived by diverse stakeholders, beyond just those involved in the planning and in organizational processes.*

Managerial implications. *This research contributes to the growing body of scholarly work that argues the benefits of cultural events and Festivals going beyond the spatial and temporal limits of the festival itself and therefore beyond the scope of typical evaluation tools. In fact, it offers valuable insight into the contribution of cultural events and Festivals on the tourism sector. From a theoretical perspective, the research reinforces the relevance of the Festival ecosystem framework suggesting the need for a more holistic view on legacy creation capacities which should go beyond economic impacts ensuring that Festivals are planned and implemented through a strategic long term approach. The idea could be to embed the cultural event as much as possible in the society, making it a community-driven and community-oriented development project as was suggested by Hartman and Zandberg (2015) when studying the candidature to host the Olympic Games of 2028 in the Netherlands.*

Cultural heritage managers should inform the different stakeholders about the specific benefits of cultural events on local development, as a mechanism to broaden the participation of the population and contribute to the promotion and protection of intangible heritage.

To sum up, the project provides contributions both (1) to the empirical literature adding knowledge on the legacy concept applying it to the cultural context; (2) to the different agents of the cultural and creative sector with benefits measures through a methodology that can be replicated in other cultural events anywhere around the world.

Originality of the paper. *This study highlights the limitations of the traditional focus on short-term economic impact when evaluating events and the lack of legacy consideration in cultural contexts (Langen and Garcia, 2009). By applying an already proposed framework and adapting it to the typical features used to analyze mega sports events, this research demonstrates how the legacy concept can properly be applied to Festivals but in the light of the specific features that cultural events have (when compared to sport ones).*

Key words: *event legacy, culture, festivals, tourism, territory, long-term effects*

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Collaborative practices of local operators: Connecting DART model to sense of community in DMO constitution[1]

FABIO CORONA[2] GIUSEPPE MELIS[3]

Abstract

This study investigates value co-creation practices that promote collaboration between local operators and stakeholders in the context of a community-based Destination Management Organization (DMO) constitution in a small town, examining their association with the DART model of value co-creation and operators' sense of community. Despite extensive research on value co-creation in tourism, limited attention has been given to residents as stakeholders, particularly regarding the psychological sense of community as a potential factor in collaborative behaviors.

Using a qualitative methodology, this work-in-progress research analyzes semi-structured interviews with local operators from different productive sectors, employing thematic analysis with a combined inductive-deductive approach. Preliminary findings from 10 interviews (with data collection still in progress) reveal elements connected to some of the DART model's dimensions-particularly Dialogue and Accessibility-and to sense of community dimensions, precisely membership and satisfaction of needs. Preliminary results indicate that reduced communication of initiatives and lack of information represent barriers to collaboration, while training provision and accessibility to institutional resources facilitate collaboration. Respondents reported strong community membership and responsibility, with collaborative behaviors emerging mainly through sector-specific and season-specific initiatives. However, collaboration challenges include inconsistent participation, lack of interest and inter-operator (more generally inter-community) jealousy.

This study provides valuable insights for destination managers by highlighting how specific actions- that can be intended as value co-creation practices- associated with the perception of a sense of community may enhance local stakeholder collaboration in small territorial contexts like the one considered for the study.

Limitations of the study include the specific, small-scale setting, insufficient sample size for theoretical saturation (at the moment), and the explorative nature of the research, that doesn't allow to take conclusion about the actual relationship between constructs.

The paper contributes to tourism management literature by exploring an underexamined construct-sense of community- and an understudied model of value co-creation-the DART model-while addressing the perspective of local residents in value co-creation processes within the constitution of a community-based DMO.

Framing of the research. *Value co-creation practices represent a significant antecedent of community collaboration in tourism context (John & Supramaniam, 2024). Value co-creation generally refers to interactive relationships between multiple stakeholders who participate in the value creation process (Prahalad & Ramaswamy, 2004; Vargo & Lusch, 2008; Chandler & Vargo, 2011). Value co-creation has been extensively studied in the tourism field, especially in terms of relationship between tourists and local/tourism firms or businesses, while not so much attention has been paid to the role of residents as stakeholders in the tourism destination system (Ribeiro et al., 2023). Some evidence showed that co-creation practices between tourists and residents can foster the residents' well-being, thus representing an important resource (Chen et al., 2020). Other scholars found that value co-creation practices are influenced by perceived economic and social benefits of tourism of local residents (Lin et al., 2017). A recent review of John & Supramaniam (2024) proposed that value co-creation practices in tourism and hospitality field can result in behavioral outcomes, like community collaboration, highlighting that co-creation practices support tourists' and local residents' engagement, promoting also the collaboration of the community and not only the collaboration of the service providers. The role of local residents has been considered crucial for tourism development success (Bichler, 2021) and their involvement and consideration is a priority (Presenza et al., 2013; Del Chiappa et al., 2018). In particular, in the context of Destination Management Organizations, the involvement of local stakeholders and more generally the relationships with the local community represent important antecedents of DMO success (Bornhorst et al., 2010). Findings suggest that value co-creation practices lead to positive outcomes, including destination competitiveness (Melis et al., 2023), enhanced*

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collaborative behaviors (John & Supramaniam, 2024), and strengthened community relationships and partnerships (Martini et al., 2017). Since community collaboration and involvement represents an important element for tourism and more specifically destination management, exploring the antecedents and drivers of collaboration (between local community stakeholders) represents an interesting venue to study. Beritelli (2011) suggested considering people first - when thinking about collaboration between different stakeholders in tourism destinations - rather than the institutions they represent. Literature has highlighted different challenges related to collaboration and collaborative initiatives regarding local communities, in the tourism field, such as information gaps, coordination challenges, and cultural barriers (Tosun, 2000) but also funding shortages and divergent stakeholder opinions (Simpson, 2008). It is important that tourism firms, like DMOs, acknowledge the existing constraints to effectively address them in their collaborative efforts.

A construct that has been found to be related to collaboration, cooperation or more generally to community participation, is the psychological sense of community (McMillan & Chavis, 1986), referring to the individual perception of the feeling of connection to a community and the corresponding influence, commitment and responsibility towards it. It originates as a social psychology construct, but has also been employed in management studies, highlighting how it could be linked to prosocial behavior and commitment to the community (Boyd & Nowell, 2014). Also, sense of community is related to community engagement (Talò, 2018). It is a multidimensional construct, consisting of membership (feeling of belonging to the community, identification with it and personal investment), influence (two-way influence between community and individual, possibility of active participation and making changes), satisfaction of needs (perception that one's needs can be satisfied through belonging to the community) and shared emotional bond (emotional bond between community members based on the sharing of common experiences).

In the tourism field, Cai and colleagues (2024) observed that psychological sense of community acts as an antecedent of residents' well-being, configuring itself as an important resource. Other studies have extensively explored community-related constructs, considering residents' perceptions: for example, Del Chiappa and colleagues (2018) studied sense of belonging and its relationship with residents' support for tourism; instead, Lee (2013) considered community attachment related to sustainable tourism development. However, sense of community has been understudied in these terms, considering that it represents a different construct from, for example, community attachment. In fact, the former describes the feeling of belonging to a group with shared interests or concerns and the psychological fulfillment derived from this membership (McMillan & Chavis, 1986), while the latter primarily focuses on affective elements and place-related aspects (Lee, 2013).

Considering that value co-creation is conceptualized as an interactive process, based on collaboration between different actors, and that this collaboration can be associated with sense of community, it could be argued that an association between value co-creation practices and sense of community exist.

Considering the context of a DMO constitution, the promotion of value co-creation practices between local operators can act as a way to reinforce the sense of community of individuals; at the same time, the perception of a sense of community can increase the motivation of the operators to carry on value co-creation practices.

A suitable model of value co-creation for exploring such a hypothesis is the DART model (Prahalad & Ramaswamy, 2004) that highlights the interactional nature of value co-creation through its dimensions: Dialogue, Accessibility, Risk assessment and Transparency. In fact, dialogue is at the basis of sharing and knowledge creation among the participants in the interaction; accessibility allows for a greater involvement of people within the process; information about the risks involved and the limits present in participating in co-creation makes people more active in the process and allows them to have more discretion; transparency of information and processes allows for greater trust to be built among all the actors involved (Taghizadeh et al., 2016).

Purpose of the paper. *The present study is based on the following research questions: "What are the value co-creation practices that can promote collaboration between local operators and other stakeholders in the context of the constitution of a DMO? How can these practices be associated to DART model of value co-creation and operators' sense of community?".*

The main objective of the paper is then to explore what are, from the point of view of the local operators, the practices that can be related to value co-creation and that are carried out in the relationship between operators, the local community and external stakeholders, in the context of the constitution of a DMO in a small rural town. Specifically, the paper intends to highlight which practices are carried out by the operators and to interpret them through the lens of the DART model of value co-creation (Prahalad & Ramaswamy, 2004). The second objective of the research is to explore if the practices can be related to a feeling of sense of community of the operators, intended as McMillan & Chavis (1986) defined it. Considering the importance of the local community in community-based tourism management and especially in the "community model" DMO (Flagestad & Hope, 2001), exploring the point of view of the operators of the community represents an insightful resource of information to understand the mechanisms and conditions that motivate local community collaboration and participation. Also, the point of view of the residents of tourism destination (in this case the operators) in value co-creation processes has been understudied in tourism literature and represents an interesting theme that can be further explored (Ribeiro et al., 2023).

Methodology. *The study employs a qualitative methodology utilizing semi-structured interviews with key informants from the tourism development project location. The sample selection criteria incorporated diverse production sectors and varying community roles. Both entrepreneurs (from hospitality, food service, agriculture and farming sectors) and presidents of cultural associations (female chorus, local folk group, art collective) were considered, because of their role*

in the community. All subjects belonged to the local community of the development area, that is a small town. Currently, a total of 10 interviews have been conducted, and the interview process is still in progress, to reach a minimum sample of 20 respondents, to reach theoretical saturation (Hennink et al., 2017). As for now, participants' age range is from 32 to 66 years old.

The interview protocol was developed through a comprehensive literature review of the sense of community (McMillan & Chavis, 1986) and DART model of value co-creation (Prahalad & Ramaswamy, 2004), and the questions were based on the theoretical sub-dimensions of each construct, as detailed in Table 1. Each interview started with an introduction that included a brief explanation of the research project, clarification of the researcher's role, and collection of basic demographic information of the respondent. Following the introduction, the interview proceeded with the seven open-ended questions. Questions were not administered with a predetermined or strict order, but they were adapted based on the natural flow of conversation and the specific responses provided by each participant. This approach was selected to make it easier for the respondents to freely express their thoughts and experiences, by simultaneously exploring the dimensions of interest in the study. Each interview lasted about 30-40 minutes, was audio-recorded and subsequently transcribed. For data analysis, a thematic analysis methodology (Braun & Clarke, 2006) has been employed, adopting a combined inductive-deductive approach, to interpret and combine the obtained data (Graebner et al., 2012), and seeking to identify elements related to the considered theoretical constructs (DART model and Sense of community) while simultaneously exploring potential relationships between identified concepts.

Table 1. Interview protocol (list of questions).

Construct	***Dimension***	***Question***
VALUE CO-CREATION (Prahalad & Ramaswamy, 2004)	*Dialogue*	*How do you receive information about events and initiatives being carried out in [name of the town]?*
	Accessibility	*What do you think are the resources that can be provided to enable active participation and collaboration by people in the project? (both from the working group and the local administration)*
	Risk assessment	*What do you think could be some problems deriving from participating to the project?*
	Transparency	*What information about the project (DMO constitution) should be shared with the community in your opinion? (both from the working group and the local administration)*
SENSE OF COMMUNITY (McMillan & Chavis, 1986)	*Memebership*	*What are the elements that make you feel you belong to the [name of the town] community?*
	Influence	*In your opinion, what is your role in the community? What do you consider to be your responsibility towards the town and its improvements?*
	Satisfaction of needs	*What are the elements that make you satisfied living in [name of the town]? (both as a town and as a community of people)*
	Shared emotional bond	*How do you evaluate the ability to collaborate on the part of the people in the [name of the town] community? Do you think there is a will to build something together in the community?*

Results. *The results obtained so far from the analysis of the interviews are preliminary but have made it possible to highlight elements that can be associated with both the DART model's dimensions of co-creation of value and the dimensions of the sense of community, as well as to collaborative behaviors between operators and the local community. Specifically, regarding the DART model, the analysis revealed contents that can be traced back to two main dimensions: dialogue and accessibility.*

About Dialogue dimension, respondents highlighted the presence of reduced communication of the initiatives promoted by the administration. In fact, despite the existing initiatives, the communication of these was not always clear and precise. This lack of information also concerned the project within which the initiative of setting up the DMO is present. Many respondents (N=7) reported that they had no idea of the existence of the project despite having it publicized in previous months. Furthermore, respondents believe that information about similar events and initiatives can be a vector for community involvement ("The community can be involved if informed") and collaboration. This theme emerged both from the interviews with entrepreneurs and from the interviews with association presidents and was a shared theme.

Considering the Accessibility dimension, entrepreneurs emphasized the need to provide (entrepreneurial) training to local people to facilitate participation in the project and the establishment of the DMO ("I think a lot has been invested here in "things", but little in training on how to handle these "things"). Training was considered important both for those who are already entrepreneurs and for people in the community who would like to contribute to the project. This aspect can be traced back to the provision (accessibility) of resources - particularly skills - to the operators. A significant example of this is represented by a young entrepreneur in the public green sector who stated: "the municipality has been very cooperative with me, helping me to start my activity", highlighting how access to institutional resources, also in the form of collaboration with the operator, can facilitate entrepreneurial activity.

The analysis also revealed the presence of contents associated with different dimensions of the construct of sense of community, with particular emphasis on belonging and satisfaction of needs.

Indeed, a theme that emerged in all the interviews conducted was that all respondents reported feeling happy to live in the community to which they belonged, perceiving a sense of responsibility towards it and recognizing that they had a

specific role to play within it. The sense of responsibility emerged in all interviews with entrepreneurs, one of whom specifically stated that he had returned 'home' after a period abroad to put the skills he had acquired at the service of the community ("I came back because I wanted to build something here [...]").

Among the presidents of cultural associations, the sense of responsibility takes on connotations more related to the cultural development of the territory ("Our association [folk group] keeps alive aspects of the local tradition […]") and social involvement of the community ("We are available to all associations, for all local events, and it is a pleasure"). These themes can be associated with the dimension of belonging, in terms of the perception of being part of and included within the community, but also partly with the dimension of influence, through the recognition of both the 'relevant' role played by each individual within the community and the role of the community and its characteristics in influencing the individual's behavior.

The satisfaction of needs is manifested in the generally positive perception of the community and the absence of significant problems reported by respondents. In terms of content related to collaborative behavior, interviewees report the presence of several collaborative initiatives at the entrepreneurial level (the farmers' cooperative or groups of young people engaged in the collection and sale of cork), but also at the "cultural" level (different cultural associations that collaborate in local traditional events), all aimed at creating value for the community.

Influence in the community was mainly reported by the presidents of cultural associations, who perceive that their activities have a significant impact on local development, in terms of promoting events that not only involve local people, but also bring people "from outside" the town.

Characteristics of the shared emotional bond dimension emerge in the description of summer events involving a large part of the local community. On these occasions, collaboration between different cultural associations is effective, with presidents stating that it is easy to collaborate and that everyone shows willingness. However, this collaboration is described as 'sectoral' and is not characterized by continuous commitment over time: availability decreases when longer participation is requested.

An ambivalent element that emerged regards the presence of jealousy between operators, interpreted negatively by entrepreneurs (all respondents highlighted this) but seen in terms of 'competition' and therefore in less negative terms, by the presidents of the cultural associations.

Preliminary results show that the aspects considered most relevant by operators and significant actors within the community for facilitating collaboration can be associated mainly with the dimensions of dialogue and accessibility of the DART model. At the same time, the most evident contents associated with the sense of community are those related to belonging and satisfaction of needs. Further interviews could highlight other practices that will be likely explained through other DART model and sense of community dimensions.

Research limitations. *While this study explores the potential relationships between practices and constructs previously underexplored in the literature and provides valuable insights for the management of tourism development initiatives, different limitations must be acknowledged. The primary limitation concerns the small-scale context of the investigation, which doesn't allow for a generalizability of the findings. Additionally, the current sample size is insufficient to achieve theoretical saturation, thus limiting the depth of analytical insights and the coherence of the results. Also, considering the explorative nature of the study, it is not possible to highlight specific relationships between the constructs, which can be further explored and tested in future studies.*

Managerial implications. *From the present study different implications can be derived, that are particularly relevant for destination managers establishing community-based Destination Management Organizations (DMOs), who seek to enhance collaboration within local communities and facilitate cooperation between different local stakeholders. By exploring the association between value co-creation practices and sense of community, this study gives destination managers practical insights regarding specific practices that can be used to support collaborative behaviors between residents of a destination. Specifically, the study proposes the DART model as an effective reference framework that can be followed to determine what practices are more associated to residents' sense of community. Consequently, practices related to dialogue, accessibility, risk assessment and transparency could help in promoting inter-operator collaboration during DMO development phases.*

Originality of the paper. *The paper explores two different constructs which have been underexplored in the context of tourism literature. In fact, in spite of the extensive exploration of constructs such as community attachment and residents' sense of belonging in tourism management literature, sense of community has not received the same attention. The construct, as conceptualized by McMillan and Chavis (1986)-defined as an individual's perception of community quality-has not been related to value co-creation. DART model of value co-creation has not also been considered so much in tourism management literature, and considering its relational nature, it is interesting to explore its potential relationship with the construct of sense of community, to understand how value co-creation practices and process can be used to foster a greater sense of community. Finally, the insufficient attention paid to destination residents' point of view, in the process of value co-creation, underscores the importance of examining their perceptions in greater detail.*

Key words: *value co-creation; tourism management; DMO; sense of community; DART model*

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The impact of mountain huts as hybrid organizations in the Italian alpine region towards a sustainable tourism development

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Abstract

Objectives. *Due to the significant evolution over time of the mountain tourism and its recent increasing density of visitors, the aim of this work in progress study is to analyse how the growth and evolution of mountain tourism impacts the management of alpine huts by examining how tourists' awareness and behaviours changes in these specific contexts.*

Methodology. *In the initial phase of the research, a desk analysis will compile a comprehensive list of all mountain huts in the study area, followed by their geographical mapping for spatial identification. The characteristics of these huts will be examined and categorized according to Club Alpino Italiano (CAI)'s classification system and other additional indicators crucial for understanding sustainable practice management due to the complexity of the context management. In the second phase of the study, we plan to implement a fieldwork analysis where tourists' behaviour and mountain huts management will be investigated with questionnaires and interviews in order to understand which actions move the strategic environmental behaviours in mountain huts.*

Findings. *The findings of this research, in its initial phase, contribute to the understanding of mountain huts as key infrastructure within the broader framework of sustainable mountain tourism. By classifying huts based on structural characteristics, geographical distribution, and management models, this research seeks to establish a solid foundation for future investigations.*

Research limits. *One of the greatest challenges of this study is navigating the vast and complex landscape of mountain huts. These structures vary significantly, distinguished by numerous criteria, making it extremely difficult to account for all their differences. Additionally, the Italian Alpine region spans a large and diverse geographical area, with varying environmental conditions that further complicate the analysis.*

Moreover, the absence of a unified national regulation for mountain hut management adds another layer of complexity. Instead, management is governed by individual regional legislations, making it difficult to establish consistent criteria for analysis. This regulatory fragmentation presents a significant challenge in determining the most relevant factors to consider in the study.

Practical implications. T*his research lays the groundwork for future studies by mapping and categorizing mountain huts. It offers both theoretical contributions and managerial implications, helping operators manage tourism's environmental impact.*

Originality of the study. *Existing research on mountain huts is scarce and mainly focuses on engineering sustainability. This study addresses the managerial gap, aiming to expand interest and encourage further academic exploration of mountain hut management.*

Framing of the research. *This work in progress research is grounded in multiple theoretical perspectives that provide a comprehensive framework for analysing mountain huts within the tourism sector development, their hybrid organizational characteristics and sustainability practices. The concept of hybrid organizations is central to understanding how mountain huts operate at the intersection of for-profit and non-profit sectors. These establishments provide essential services (shelter, food, safety) similar to non-profit organizations while simultaneously engaging in market-driven activities to ensure financial sustainability (Boyd et al., 2017; Brozek, 2009). This hybridity influences decision-making processes, management strategies, and operational constraints, particularly in remote and high-altitude locations.*

Mountain tourism is inherently linked to environmental sustainability, as it depends on natural landscapes, biodiversity, and ecological balance (Zuzana & Zuzana, 2015). However, as tourism demand increases, issues such as

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waste production, resource consumption, and environmental degradation become critical challenges (Demirović et al., 2017). Sustainable tourism frameworks (Unep/Pnuma, 2007) emphasize the need for responsible management, particularly in fragile ecosystems like the Alpine region where the mountain tourism trend is increasing over and over. In addition, the sustainability practices to reduce the tourism impact have become a significant issue in the hospitality industry, particularly in remote tourism establishments where logistical challenges and supply chain limitations exacerbate waste management difficulties (Bausch & Gartner, 2020). Given the complexity and the logistic provisioning in mountain huts, understanding management strategies is crucial for improving efficiency and minimizing environmental impact. This research focuses on mountain huts as hybrid organizations, conceptualized not only for the dualism between private and public ownership but also for the social impact and value profit generation (Jäger and Schröer, 2013) that they generate, and their role in environment sustainability management. The study is organized into two phases:

1. *Mapping mountain huts in the Italian alpine region. The first phase involves a desk analysis to identify and map the geographical distribution of mountain huts across the Italian Alps. Once identified, the huts will be categorized using specific criteria such as CAI affiliation, accessibility, supply logistics, and other relevant factors.*
2. *Investigating governance, operational challenges, and environmentally sustainable strategies.*

The second phase will explore the managerial perspective by interviewing mountain hut managers to understand their governance structures and operational challenges. Additionally, the visitor perceptions of mountain huts (including awareness of environment impact issues in mountain tourism) will be assessed through surveys to capture tourist behaviour and attitudes. In the end a behaviour-based model will be employed to identify and promote more responsible and sustainable practices and identifying the specific factors for achieving optimal outcomes in order to reduce environmental impact in mountain huts.

Purpose of the paper. *Over the past decade, mountain tourism has experienced significant growth across various countries (Pröbstl et al., 2016; Bertocchi et al., 2021; Moss et al., 2009). It has emerged as the second most visited tourism destination after coastal areas (UNEP/PNUMA, 2007; Zuzana & Zuzana, 2015), contributing approximately 15-20% to global tourism, with an estimated annual economic value ranging between 70 and 90 billion dollars (Taher et al., 2015). The European Alps alone accounted for approximately 7-10% of global tourism revenues in 2002 (Duglio & Beltramo, 2019), demonstrating the economic significance of this sector. However, the concentration of mass tourism in a few alpine areas across Europe (Eurostat, 2025) raises concerns regarding sustainable development and management. A defining characteristic of mountain huts is their fluctuating demand patterns, with peaks occurring during the summer and, in some cases, the winter seasons. Consequently, their management must incorporate flexibility to address uncertainties stemming from climatic conditions, environmental restrictions, and regulatory limitations. Given the increasing importance of mountain tourism in both economic and environmental contexts, research in this field has expanded. This study seeks to analyse the role of mountain huts as hybrid organizations in managing the development of mountain tourism in the Italian alpine region.*

Mountain huts were initially established as shelters for individuals seeking refuge in mountain environments. Over time, they evolved into facilities that provide fundamental needs such as accommodation and sustenance. In Italy, mountain huts are classified as part of the real estate sector; however, they do not operate within the framework of conventional real estate market regulations, nor are they managed by professional real estate entities. Their operational complexity necessitates specialized expertise and technologies to function effectively within the challenging mountain tourism sector.

While Italian legislation subjects mountain huts to Law 135/2001, which governs certain aspects of the tourism sector (such as workplace safety, tourism management, and financial oversight), there is no comprehensive national regulation governing their construction and operation. Instead, individual regions establish their own guidelines, resulting in a fragmented and often ambiguous regulatory landscape. This regulatory deficiency complicates managerial decision-making, leading to inconsistencies in operational strategies.

Given their unique characteristics and the absence of a coherent legislative context, mountain huts can be conceptualized as hybrid organizations that operate at the intersection of for-profit and non-profit models. This classification invites a reconsideration of the traditional managerial roles and business objectives associated with these establishments (Haigh & Hoffman, 2011). Mountain huts occupy a distinctive position between the for-profit and non-profit sectors. On the one hand, they fulfill a social and environmental mission akin to that of non-profit organizations by providing essential refuge and hospitality services. On the other hand, they engage in revenue-generating economic activities characteristic of for-profit enterprises (Boyd et al., 2017). The hybrid nature of these organizations is not merely an empirical observation but an analytical reality inherent to their structural and functional composition (Boyd et al., 2017).

In social sciences, hybridity is often understood as a continuum of characteristics that blend elements from two traditionally opposing domains (Brozek, 2009; Makadok & Coff, 2009). We consider mountain huts as an exemplification of this hybridity through three key dimensions: (1) their organizational purpose, which balances for-profit and non-profit objectives (Brozek, 2009; Boyd et al., 2017); (2) their product status, which encompasses both goods and services (Lusch & Vargo, 2011); and (3) their ownership and governance structures, which can be private, cooperative, or public (Boyd et al., 2017; Billis, 2010). Building upon the theoretical frameworks of Brozek (2009) and Makadok and Coff (2009), mountain huts in the Italian alpine region exhibit hybrid characteristics not only in their business models or product status but also in their governance structures.

One of the most prominent entities overseeing mountain huts in Italy is the Club Alpino Italiano (CAI), a national association founded in the 19th century with the primary objective of promoting the exploration and scientific study of Italian mountains. CAI operates as a non-economic public entity, yet it owns numerous mountain huts, which are managed through a subcontracting system by private operators. Under this arrangement, CAI retains ownership while entrusting the operational management to private individuals who, in turn, develop tourism-based economic activities within the prescribed framework of the CAI statute. This governance model ensures a balance between economic viability and the preservation of the social and environmental functions of mountain huts.

In contrast, privately owned mountain huts are both managed and operated by individual proprietors, who retain full control over their business strategies. Unlike CAI-affiliated huts, these establishments are subject only to national and regional legislation, without additional regulatory constraints imposed by an overseeing institution. This model provides greater operational autonomy but also necessitates strategic adaptability to navigate the complex and often inconsistent regulatory landscape. In both cases, managers must possess not only strong managerial capabilities but also a deep connection to mountain environments and a commitment to sustainability.

Mountain tourism represents a vital segment of the global tourism industry, with significant economic implications. Within this sector, mountain huts serve as pivotal infrastructure, supporting both recreational activities and economic development. However, their management is complicated by fluctuating demand patterns, environmental constraints, and an inconsistent regulatory framework. The classification of mountain huts as hybrid organizations provides a valuable analytical lens through which to understand their dual economic and social roles. By straddling the boundaries between for-profit and non-profit models, these establishments contribute to both economic growth and environmental stewardship. Future research should further explore the implications of hybrid governance structures and the potential for regulatory harmonization to enhance the efficiency and sustainability of mountain tourism management.

The increasing accessibility of mountain areas, facilitated by technological advancements such as improved lift systems and electric bikes, has significantly intensified tourist flows. As a result, even high-altitude mountain huts, once difficult to reach, are now experiencing an overwhelming influx of visitors, creating substantial environmental repercussions (Becken & Hay, 2008). In the European alpine region, many remote wilderness destinations are struggling with the pressures of increased tourism, exhibiting characteristics akin to mass tourism (Nepal, 2002; Eurostat, 2022).

This trend has led to heightened concerns about sustainable tourism management. The environmental impacts of excessive visitor numbers include soil erosion, waste generation, biodiversity loss, and water resource depletion (Demirović et al., 2017). Moreover, the construction and expansion of tourism infrastructure often lead to habitat fragmentation, disrupting local ecosystems (Zuzana & Zuzana, 2015). Consequently, the management of mountain destinations must consider the potential alteration of natural conditions due to increasing tourism demand before making any decisions regarding further development (Demirović et al., 2017). Therefore, destination management should focus not only on environmental protection but also on maintaining social and economic balance.

Mountain huts play a crucial role in sustaining tourism within the Italian alpine region, acting as both economic enterprises and essential providers of shelter in challenging environments. Their hybrid nature demands a governance approach that integrates both financial sustainability and environmental responsibility. However, the regulatory landscape remains fragmented, presenting obstacles to effective management. Addressing these challenges requires increased collaboration between public institutions, private operators, and policymakers to develop coherent strategies that support both tourism growth and environmental conservation.

Methodology. *This study aims to examine the behaviour of mountain hut tourists concerning environmental impact across different types of mountain huts in the Italian alpine area. As first phase of the research, an initial analytical investigation is needed for compiling a comprehensive list of all mountain huts in the study area, followed by their geographical mapping to facilitate their spatial identification. Additionally, during this first phase of desk analysis, the characteristics of the different huts will be examined to categorize them according to CAI's classification system (A, B, C, D, E). The second phase of the research will involve fieldwork, where tourists' behaviour and awareness regarding environmental impact will be investigated through face-to-face interviews with mountain hut managers and surveys administered to mountain hut visitors. This study considers several theoretical frameworks to explain different behaviours and attitudes and how they influence individual actions. For instance, Ajzen et al. (2011) developed the Theory of Reasoned Action, a model that represents personal behaviours in decision-making. By introducing behavioural intention as an intermediary between predisposition and actual behaviour, they emphasized the role of intention over the performed action, suggesting that the desire to purchase may be a stronger determinant than the act of purchasing itself. Another relevant framework is Schwartz's (1977) Norm-Activation Model, which explores how individuals make moral decisions and the values that shape their choices, actions, and preferences. Additionally, the Value-Belief-Norm (VBN) theory by Stern et al. (1999) is particularly useful in environmental contexts, as it identifies the factors that drive pro-environmental behaviours. These three models represent just a few of the theoretical approaches that can be applied in this study. They support the core objective of understanding the factors that influence individual behaviour, particularly in relation to waste separation and responsible waste management. However, additional frameworks may also be explored to provide a more comprehensive analysis. Consequently, a behaviour-based model will be employed to identify and promote more responsible and sustainable practices. Identifying the specific factors that influence behaviour will help determine the most effective interventions for achieving optimal outcomes.*

Results. *The findings of this research, in its initial phase, will contribute to the understanding of mountain huts as key infrastructure within the broader framework of sustainable mountain tourism. This phase focuses on the systematic mapping of mountain huts in the Italian alpine region through desk analysis. By classifying huts based on structural characteristics, geographical distribution, and management models, this research seeks to establish a solid foundation for future investigations.*

A crucial aspect of this research is the categorization system adopted for mountain huts. Following the definition provided by the Club Alpino Italiano (CAI), a mountain hut is not merely an accommodation facility but also a structure designed to support mountain activities by providing hospitality and essential services, including emergency shelter (Club Alpino Italiano, n.d., Title 2, Art. 1). CAI classifies huts based on two primary criteria:

1) *accessibility for hikers and;*
2) *the logistics of supply transport.*

These classifications include: (A) huts accessible by private vehicle or within a 10-minute walk from a parking area (including those reached via ticketed transport services); (B) huts accessible via cableways or within 10 minutes of a lift terminal; and categories (C), (D), and (E), which are determined by the estimated hiking time according to CAI trail maps. In terms of supply logistics, helicopter transport incurs the highest costs, whereas cableways require an initial investment that is amortized over several years. Huts classified as category D or higher typically rely on helicopter transport, while category E huts are invariably located more than four hours from the nearest access point (Club Alpino Italiano, n.d.,).

Tab. 1: CAI categories classification of mountain huts

Hours' hiking	Motorized vehicle	Lift	Helicopter
From 0 to 10 minutes	A	B	-
From 10 minutes to 2 hours	C	C	D
From 2 to 4 hours	C	D	D
More than 4 hours	D	E	E

Beyond these technical categorizations, this study reconceptualizes mountain huts as hybrid organizations that operate at the intersection of economic, social, and environmental responsibilities. Hybrid organizations blend elements from both for-profit and non-profit models, making them particularly relevant to understanding the challenges of mountain hut management. The classification of huts as hybrid organizations stems from their dual nature: they fulfil a social and environmental mission by providing essential services in remote areas while simultaneously engaging in revenue-generating economic activities (Boyd et al., 2017). The extent of hybridity varies depending on ownership and governance structures, which significantly influence operational decision-making.

Mountain huts in Italy fall under two primary ownership and management models: those operated by CAI (or similar associations) and those privately owned. CAI-affiliated huts function under a governance framework that prioritizes accessibility and environmental stewardship. Despite generating revenue through hospitality services, their operational constraints align more closely with public or non-profit models, as they must comply with specific guidelines set by CAI. These huts employ a subcontracting system in which private individuals manage day-to-day operations under CAI's overarching principles. Another important aspect about the hybrid organizations that permits to analyse the mountain huts with management lens is the aim critical trade-off the between the aim to develop a social network and take action to support solidarity common values (Granovetter 1983) and the financial effort in order to maintain a minimum profit to keep the business running (Jäger and Schröer, 2013). This model ensures that while economic sustainability remains important, it does not override the hut's social and environmental obligations.

In contrast, privately owned mountain huts operate autonomously, adhering only to standard hospitality and restaurant service regulations. These establishments function as service enterprises akin to traditional tourist accommodations, with the primary distinction being their location in remote mountain settings. Unlike CAI-affiliated huts, private huts are not subject to additional institutional guidelines, allowing greater flexibility in management decisions. However, this autonomy also introduces challenges, particularly concerning the balance between profitability and sustainability. These huts must independently navigate operational constraints such as supply logistics, seasonal demand fluctuations, and environmental preservation while maintaining financial viability.

By recognizing mountain huts as hybrid organizations, this study highlights the complexities of their management. Their operational models must account for fluctuating visitor demand, environmental restrictions, and regulatory inconsistencies. Moreover, managers must balance their role as service providers with their responsibility to uphold the cultural and ecological integrity of mountain environments. This hybrid nature influences decision-making processes related to sustainable management practices and efforts. According to the literature, one of the most problem of mountain huts management is the provision and disposal of waste, that change consistently depending on the characteristics and location of mountain huts have (Khan et al., 2021; Semernya et al., 2017, Reno, 2015).

The classification system developed for this study builds upon CAI's existing framework but introduces additional indicators crucial for understanding sustainable practice management. These include:

1. *The ownership structure (association managed vs. privately owned);*
2. *The seasonality of operations (year-round vs. seasonal operation);*

3. *The type of power source adopted;*
4. *The type of water stored and distribution;*
5. *The number of supply provisions per season;*
6. *The type of waste disposal management;*
7. *The type of services provided (restaurant only or restaurant with overnight accommodation);*
8. *The average number of meals served per day.*

The selection of these criteria emerged from both a literature review and personal experience. Numerous studies have examined the influence of ownership structures on management financial and communal socially outcomes (Jäger and Schröer, 2013; Granovetter, 1985), while research in environmental engineering has increasingly focused on the sustainability of mountain huts, particularly in terms of energy sources and water management in these unique settings. Additionally, personal experience and firsthand knowledge of this context play a crucial role in this phase, as we are directly immersed in it. The selected indicators reflect our current understanding, but this aspect remains open to further refinements as new insights emerge. Additional factors, such as altitude or the ease of contacting the huts, may be considered as the study progresses. I acknowledge that incorporating a broader range of criteria can enhance the accuracy of the mapping process, yet this step also represents one of the study's key trade-offs. Nevertheless, these criteria provide a solid foundation for selecting huts for further investigation, particularly concerning sustainability management. A thorough understanding of these variables will enable a more detailed analysis of the factors influencing environmental impact and waste disposal strategies. Moreover, this selection process ensures that the research framework accounts for diverse managerial approaches, highlighting the interplay between economic viability and sustainability. Another critical dimension of this discussion is the evolving relationship between tourism demand and the natural mountain experience. Mountain huts cater to a diverse range of visitors, from experienced hikers to casual tourists, each with distinct expectations and consumption patterns. The attractiveness of mountain destinations is rooted in several factors, including scenic landscapes, biodiversity, fresh air, and opportunities for outdoor sports and cultural exploration (Zuzana & Zuzana, 2015). However, as mountain tourism operates as an open-access system, where anyone can visit and benefit from these resources, it also generates environmental challenges that must be mitigated (Demirović et al., 2017). The increasing accessibility of high-altitude areas, facilitated by technological advancements such as improved lift systems and electric bikes, has further intensified tourism flows (Paunović & Jovanović, 2017; Bausch & Gartner, 2020).

This influx of visitors has led to significant environmental and operational pressures on mountain huts. Previously isolated high-altitude huts, which once catered primarily to experienced mountaineers, now accommodate a broader tourist demographic, many of whom have different consumption habits and waste generation patterns. Consequently, tourism operators face increasing pressure to balance visitor satisfaction with sustainable management practices. The challenges posed by mass tourism in alpine regions underscore the need for targeted strategies to ensure environmental conservation without compromising the economic viability of tourism enterprises.

The hybrid nature of mountain hut management presents both challenges and opportunities in responding to these tourism pressures. Association-managed huts benefit from institutional oversight, which helps regulate visitor impact through reservation systems, pricing structures, and environmental guidelines. However, their operational flexibility is often constrained by bureaucratic procedures and funding limitations. On the other hand, privately owned huts enjoy greater managerial autonomy, allowing them to adapt more quickly to market demands. However, this flexibility also entails a higher risk of unsustainable practices driven by profit motives.

Given these dynamics, it is imperative to develop governance strategies that integrate best practices from both management models. Hybrid governance structures that combine elements of institutional regulation with entrepreneurial flexibility may offer a viable solution. For instance, implementing standardized sustainable management protocols across both private and association-managed huts could enhance sustainability efforts. Similarly, fostering collaborations between public institutions and private operators could facilitate knowledge-sharing initiatives, improving resource efficiency and environmental conservation measures.

Mountain huts play a crucial role in the broader landscape of mountain tourism, serving as both economic entities and guardians of alpine heritage. Their classification as hybrid organizations provides a valuable analytical framework for understanding the complex interplay between profitability, sustainability, and visitor management. By mapping mountain huts based on diverse criteria, this research lays the groundwork for future investigations into sustainable management and operational strategies.

Future research should further explore the managerial implications of hybrid governance models, assessing their effectiveness in mitigating tourism pressures while maintaining financial viability. Additionally, comparative analyses between different alpine regions could provide insights into best practices for harmonizing regulatory frameworks and enhancing sustainability efforts. Ultimately, the findings of this study contribute to the ongoing discourse on sustainable mountain tourism, emphasizing the need for integrated management approaches that balance economic growth with environmental preservation and understanding how policymakers and stakeholders can work towards a more sustainable future for mountain tourism.

Research limitations. *One of the main challenges of this study is addressing the diversity and complexity of mountain huts. These structures differ widely in terms of ownership, accessibility, services offered, and environmental conditions, making it difficult to establish a single set of criteria that fully captures their variety. Furthermore, the Italian Alpine*

region is vast and geographically diverse, with variations in climate, altitude, and infrastructure that further complicate the analysis.

Another significant challenge is the absence of a unified national regulation governing mountain hut management. Instead, each region follows its own legislation, leading to inconsistencies in operational standards, sustainability requirements, and waste management policies. For example, some regions may impose stricter environmental regulations, while others prioritize accessibility and tourism development. This regulatory fragmentation makes it more difficult to define common indicators for comparison, requiring a flexible and adaptive approach in selecting relevant criteria for the study.

Managerial implications. *The research establishes a solid foundation upon which further research can build. First of all, this work wants to realize a map and categorization of mountain huts and a further aim will investigate the second phase of the analysis related on research-tools design identified. By addressing this topic, the study not only contributes to theoretical discussions but also offers valuable managerial implications as a strategic management tool for mountain hut operators to mitigate the negative impact of tourism on the mountain environment. Moreover, given the persistent challenge of environmental impact, this research serves as a starting point for a more comprehensive exploration of the issue, ultimately contributing to the development of innovative strategies for reducing tourism negative impact in mountain huts.*

Originality of the paper. *The existing literature on mountain huts is limited, with most studies focusing on sustainability from an engineering perspective. This research aims to contribute to the managerial field, addressing the existing gap and expanding interest in this topic. By doing so, it seeks to stimulate further studies and encourage a broader exploration of mountain hut management within academic research.*

Key words: *Mountain tourism management, Sustainability tourism management, Tourists' behaviour, Alpine huts, Hybrid organizations.*

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Il nomadismo digitale come fenomeno turistico. Analisi sull'attrattività dei borghi italiani e sulle opportunità di valorizzazione dei territori

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Abstract

Il fenomeno del nomadismo digitale ha assunto un ruolo crescente nell'economia globale, trasformando profondamente le dinamiche del lavoro e del turismo. Con circa 35 milioni di nomadi digitali nel mondo (Statista, 2024), di cui l'1,4% italiani (Flatio, 2023), emergono nuove opportunità e sfide per le destinazioni turistiche, in particolare per i borghi italiani. Questa ricerca esplora l'attrattività dei borghi italiani per i nomadi digitali, analizzando i fattori che influenzano la scelta di queste destinazioni e le strategie di valorizzazione territoriale più efficaci. A tal fine, è stato sviluppato il Digital Nomads Attractiveness Index (DNAI), un indicatore quantitativo che misura il potenziale attrattivo dei borghi italiani in base a sei dimensioni chiave (costo della vita, connettività, spazi di coworking, ambiente, mobilità, attività). L'approccio metodologico combina un'analisi quantitativa, attraverso la costruzione del DNAI, con l'analisi di un caso studio (che ha previsto la conduzione di interviste e la somministrazione di questionari) focalizzata sul caso studio del borgo di Montecreto, in provincia di Modena, che ha recentemente avviato strategie di valorizzazione e promozione territoriale per attrarre, tra i diversi segmenti turistici ritenuti strategici, i nomadi digitali.

I risultati evidenziano come i borghi situati in aree montane del Nord-Est mostrino un'elevata attrattività, grazie al livello delle attività turistiche e a una crescente infrastrutturazione digitale. L'analisi del caso Montecreto conferma il potenziale dei piccoli borghi nel ridefinire la propria offerta turistica in chiave sostenibile, puntando su soggiorni di media-lunga durata e promuovendo modelli di turismo destagionalizzato.

La ricerca sottolinea l'importanza di strategie partecipative di destination management, in grado di valorizzare le specificità locali e favorire un'integrazione armoniosa tra nomadi digitali e comunità ospitanti. Le implicazioni manageriali evidenziano come l'attrazione di nomadi digitali nei borghi possa rappresentare una leva per la rivitalizzazione delle aree interne e la diversificazione dell'offerta turistica, contribuendo al raggiungimento di obiettivi di sostenibilità sociale ed economica.

Contesto della ricerca. *Il nomadismo digitale rappresenta un fenomeno emergente che si colloca all'intersezione tra trasformazioni socio-economiche globali (D'Andrea, 2016), innovazioni tecnologiche (Richter A. et al., 2018) e nuovi modelli di mobilità lavorativa* (*Uriely, 2001; Bassyiouny & Wilkesmann, 2023). Nato come nicchia culturale alla fine degli anni '90 (Makimoto & Manners, 1997), il fenomeno ha registrato una crescita esponenziale negli ultimi anni, accelerata dall'avanzamento della digitalizzazione e dal diffuso ricorso allo smart working durante la pandemia di COVID-19 (Shawkat et al., 2021). Attualmente, la comunità globale dei nomadi digitali conta circa 35 milioni di individui, con un crescente interesse verso destinazioni che combinano qualità della vita, connessione digitale e ricchezza culturale (Statista, 2024).*

La letteratura scientifica ha analizzato il nomadismo digitale attraverso diverse prospettive disciplinari, tra cui sociologia, economia e studi culturali (D'Andrea, 2016; Hermann & Paris, 2020). Nell'ambito del tourism management, l'attenzione si è focalizzata sui fattori di attrattività delle destinazioni, sugli impatti socio-economici del fenomeno e sulle dinamiche di interazione tra nomadi digitali e comunità locali (Bassyiouny & Wilkesmann, 2023; Hannonen, et al. 2023; Miocevic, 2024; Mancinelli, 2022).

Il fenomeno del nomadismo digitale genera numerosi impatti socio-economici sui territori ospitanti, influenzando in modo significativo lo sviluppo delle destinazioni coinvolte. Zhou et al. (2024) e Bassyiouny & Wilkesmann (2023) evidenziano come l'arrivo di nomadi digitali in territori prevalentemente rurali o marginalizzati possa contribuire al rilancio economico locale, promuovendo la nascita di nuove imprese, l'incremento dei consumi nei servizi locali e la

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rigenerazione urbana. Tuttavia, studi recenti (Hannonen, 2023; Miocevic, 2024) hanno messo in guardia su potenziali criticità associate al fenomeno, quali la possibile pressione sul mercato immobiliare con aumento del costo della vita e fenomeni di gentrificazione. Thompson (2019) sottolinea altresì il rischio della formazione di comunità parallele, poco integrate nel tessuto sociale locale, evidenziando la necessità di elaborare strategie di Destination Management orientate all'inclusione sociale e alla sostenibilità di lungo periodo, al fine di garantire un equilibrio tra sviluppo turistico, tutela dell'identità locale e qualità della vita della popolazione residente. A fronte delle opportunità, ma anche delle criticità evidenziate dalle ricerche sino ad ora condotte, emerge un knowledge gap concernente, da un lato strumenti e indicatori per misurazione il potenziale attrattivo dei territori, dall'altro lato, scelte di Destination Management che le destinazioni possono adottare, per attrarre questo segmento di domanda.

In Italia, l'interesse per il nomadismo digitale è cresciuto negli ultimi anni, grazie anche al contributo dell'Associazione Italiana Nomadi Digitali (AIND), che ha evidenziato come il 93% dei nomadi digitali intervistati esprima una preferenza per soggiorni in piccoli borghi e aree interne, percepiti come luoghi di maggiore benessere e autenticità (AIND, 2022). Questo dato apre una riflessione sulle opportunità di valorizzazione territoriale offerte da questo segmento di domanda, in particolare per i borghi italiani, spesso caratterizzati da dinamiche di spopolamento e marginalizzazione economica.

Nonostante l'interesse crescente per il nomadismo digitale, la letteratura scientifica presenta ancora lacune nell'analisi sistematica dell'attrattività dei borghi per i nomadi digitali e nelle metodologie per valutarne l'impatto sulle destinazioni minori. In particolare, manca uno strumento di misurazione che consenta di quantificare il potenziale attrattivo di un borgo sulla base di variabili oggettive, come connettività digitale, costo della vita e qualità dei servizi. Parallelamente, è ancora limitata l'indagine sulle strategie di co-progettazione territoriale, capaci di integrare le esigenze delle comunità locali con quelle dei nomadi digitali, massimizzando i benefici economici e sociali e mitigando al contempo i rischi di gentrificazione e frammentazione sociale.

Per tale ragione si è voluto esplorare un filone di studi del Destination Management che viene incontro al rispondere alle esigenze delle comunità ospitanti e degli ospiti: il destination design. Ildestination design è un approccio interdisciplinare che nasce dagli studi di design e che combina design thinking, gestione strategica e governance partecipativa per trasformare le destinazioni turistiche (Volgger et al., 2021). L'approccio del destination design è stato applicato con successo a diversi contesti, dimostrando la sua efficacia nel favorire innovazione, sostenibilità e rigenerazione territoriale (Scuttari et al., 2021). Attraverso l'utilizzo del design thinking, il modello consente di rispondere alle esigenze emergenti del turismo, integrando le istanze delle comunità locali con le opportunità offerte dai mercati globali. Thomas & McNeice (2022) propongono un modello strutturato in sei fasi, basato su co-creazione, sperimentazione e valutazione degli impatti, ridefinendo il ruolo delle DMO come facilitatori dello sviluppo locale. L'adozione del destination design nelle strategie di Destination Management permetterebbe di rispondere alle esigenze emergenti del turismo, favorendo innovazione, sostenibilità e rigenerazione territoriale.

Obiettivo del paper. *Il nomadismo digitale è un fenomeno complesso, tra le diverse chiavi di lettura ci si è soffermati sull'approccio turistico. L'obiettivo principale di questo studio è analizzare l'attrattività dei borghi italiani come destinazioni per nomadi digitali, esplorando i fattori determinanti nella scelta di tali luoghi e individuando strategie efficaci di valorizzazione territoriale. Il fenomeno del nomadismo digitale, in costante espansione, offre nuove opportunità di sviluppo per le aree interne e i piccoli comuni italiani, spesso soggetti a dinamiche di spopolamento e declino socio-economico (Symbola, 2023). Inoltre, il "Secondo Rapporto del Nomadismo Digitale in Italia" riporta che il 93% dei nomadi digitali intervistati desidera vivere un'esperienza in un borgo italiano (cfr. AIND, 2022). Tuttavia, la mancanza di strumenti specifici per misurare l'attrattività dei territori e la carenza di applicazioni pratiche di modelli partecipativi di Destination Management mirati ostacolano il pieno sfruttamento di questo potenziale.*

Questa ricerca si propone di contribuire a tale dibattito scientifico attraverso due principali direttrici di indagine. In primo luogo, intende sviluppare e applicare un indicatore quantitativo, il Digital Nomads Attractiveness Index (DNAI), capace di misurare il grado di attrattività dei borghi italiani per i nomadi digitali, basandosi su variabili chiave come il costo della vita, la connettività, la disponibilità di spazi di coworking, la qualità ambientale, i trasporti e il livello di attività turistiche presenti. In secondo luogo, lo studio esplora le strategie di Destination Management, in particolare di destination design, che possano supportare i piccoli comuni nell'attrarre e integrare questo segmento di domanda, garantendo uno sviluppo territoriale sostenibile e inclusivo.

Le domande di ricerca che guidano questo studio sono le seguenti:

- *RQ1: Come si può misurare il grado di attrattività dei borghi per i nomadi digitali?*
- *RQ2: Quali strategie devono adottare i borghi per diventare più attrattivi per tale segmento di mercato?*

Attraverso queste domande, lo studio mira a fornire un quadro analitico e operativo utile sia per la comunità scientifica, sia per i policy maker, offrendo strumenti concreti per la valorizzazione dei territori e contribuendo al dibattito su turismo sostenibile e innovazione nelle strategie di sviluppo locale.

L'analisi del caso studio del borgo di Montecreto, in provincia di Modena, consente di approfondire le dinamiche di co-progettazione territoriale e di valutare l'efficacia delle strategie adottate per attrarre nomadi digitali. Il paper evidenzia le implicazioni manageriali delle strategie di attrazione, ponendo attenzione alle opportunità di crescita economica e rigenerazione sociale.

Metodologia. *La metodologia combina approcci quantitativi e qualitativi al fine di adottare una visione completa e multidimensionale del fenomeno del nomadismo digitale nei borghi italiani. L'obiettivo è duplice: 1) misurare il grado di attrattività dei borghi e 2) analizzare le strategie di valorizzazione territoriale più efficaci, con un focus specifico sui*

processi di progettazione partecipata. A tal fine, la ricerca si articola in due fasi principali: 1) costruzione del Digital Nomads Attractiveness Index (DNAI) e 2) analisi del caso studio di Montecreto:

- ***Costruzione del Digital Nomads Attractiveness Index (DNAI)**: la prima fase ha previsto lo sviluppo di un indicatore quantitativo volto a misurare il potenziale attrattivo dei 5.538 borghi italiani (intesi come comuni con meno di 5.000 abitanti[5]). L'indice è stato costruito seguendo un approccio a più fasi (cfr. Tabella 1):*
  1. ***Selezione delle dimensioni rilevanti**: a seguito dell'analisi della letteratura scientifica e degli studi condotti da enti di ricerca internazionali (grey literature) che evidenziano best practice in tema di nomadismo digitale, sono state identificate sei dimensioni chiave per la definizione del DNAI. La scelta delle dimensioni si è basata in particolare sul framework "7 layers" proposta dal Digital Nomads Observatory (2021).*
  2. ***Raccolta dati**: per ogni dimensione, sono stati raccolti dati da fonti secondarie ufficiali come ISTAT, ISPRA ed European Data Journalism Network; altri dati sono stati ottenuti tramite tecniche di web scraping su siti come: Airdna, 3Bmeteo e Google Maps. Per quanto riguarda il periodo di riferimento, i dati raccolti da banche dati di terze parti si riferiscono al 2022 (molti di questi dati descrivono parametri che tendono a cambiare lentamente nel corso del tempo, quindi, prendendo come riferimento il periodo che intercorre tra la fine del 2022 e il 2024, (si ritiene che non siano sopravvenuti grandi cambiamenti), mentre i dati raccolti tramite scraping, risalgono alla prima metà del 2024.*
  3. ***Pulizia dati**: non avendo ottenuto i dati di tutte le dimensioni per tutti i comuni, si è proceduto per una pulizia, eliminando i comuni che avessero mancanti i valori di una o più dimensioni, raggiungendo un campione di 1.825 borghi.*
  4. ***Normalizzazione e ponderazione**: i dati raccolti sono stati normalizzati per garantire omogeneità tra le variabili. Successivamente, ogni dimensione è stata ponderata sulla base delle preferenze dei nomadi digitali, emerse dall'analisi del Secondo Rapporto dell'Associazione Italiana Nomadi Digitali (AIND, 2022) abbinando ogni dimensione dell'indice a risposte emerse dall'indagine.*
  5. ***Analisi delle Componenti Principali**: i dati sono stati sottoposti a un'Analisi delle Componenti Principali, evidenziando che se si volessero scegliere le prime due componenti principali per rappresentare il data set, solo la variabile della "Connessione" sarebbe esclusa; sebbene essa sia quasi totalmente rappresentata dalla terza dimensione, si è optato di mantenerla nell'indicatore.*
  6. ***Calcolo dell'indice e analisi statistica**: il punteggio complessivo per ciascun borgo è stato standardizzato su una scala da 0 a 100. L'indice è stato poi utilizzato per condurre una cluster analysis, al fine di identificare gruppi omogenei di borghi con caratteristiche simili in termini di attrattività per i nomadi digitali. Questa è la formula dell'indice:*

$$DNAI = (At_i)p_{At} + (Am_i)p_{Am} + (MT_i)p_{MT} + (C_i)p_C + (SC_i)p_{SC} + (CV_i)p_{CV}$$

Dove:

- *DNAI corrisponde al Digital Nomads Attractivness Index;*
- *gli altri valori rappresentano: i punteggi per ogni variabile (es. At_i rappresenta il punteggio della variabile Attività) e i pesi (es. p_{At} è il peso della variabile dell'ambiente).*

Tab. 1 Metodologia adottata per la costruzione dell'indicatore DNAI

Dimensioni	***Variabili***	***Fonti***	***Tipologia dati***	***Metodologia di raccolta***	***Risposte al questionario***	***Pesi***
1. Attività	*Indice sintetico di attività economiche connesse al turismo (quintili)*	*ISTAT (2023)*	*Secondari*	*Desk analysis*	*Attività culturali (40%)*	*0,152*
2. Ambiente	*Indicatori di qualità dell'aria*	*3bmeto (2024)*	*Primario*	*Web scraping*	*Clima (33%)*	*0,165*
	Suolo non consumato aree tutelate	*ISPRA (2023)*	*Secondari*	*Desk analysis*	*Bellezze naturali (54%)*	
3. Mobilità e trasporti	*Stazioni ferroviarie con servizio passeggeri attivo*	*ISTAT (2023)*	*Secondari*	*Desk analysis*	*Qualità dei trasporti (26%)*	*0,099*
	Accessi alla rete autostradale					
	Aeroporti					
	Porti con servizio passeggeri					
4. Connettività	*Velocità di connessione Upload*	*European Data Journalism Network (2023)*	*Secondari*	*Desk analysis*	*Qualità della connessione internet (65%)*	*0,247*
	Velocità di connessione Download					
	Velocità di connessione Latency					
5. Spazi di Coworking	*N. coworking presenti*	*Google Maps (2024)*	*Primari*	*Web scraping*	*Presenza di spazi di lavoro condivisi (28%)*	*0,106*
	Valutazione Google Reviews media per i coworking presenti nei comuni					
6. Costo della vita	*Costo medio per notte in soluzioni di affitti brevi*	*Airdna (2024)*	*Primari*	*Web scraping*	*Costo della vita (61%)*	*0,231*

Fonte: ns elaborazione da "7 layers" proposta (Digital Nomads Observatory, 2021)

[5] Ad oggi (anno 2025) non esiste una classificazione che definisca quali e quanti sono i borghi in Italia. Esistono tuttavia circuiti di eccellenza che coinvolgono i borghi, come per esempio "I Borghi più belli d'Italia", la "Bandiera Arancione" del Touring Club, "Borghi Autentici".
Una definizione per "borghi storici" ci perviene dal *Ministero della Cultura* nell'indizione del *Bandi Borghi del PNRR – Linea B*, ovvero sono definiti come <<*quegli insediamenti storici chiaramente identificabili e riconoscibili nelle loro originarie caratteristiche tipo-morfologiche, per la permanenza di una prevalente continuità dei tessuti edilizi storici e per il valore del loro patrimonio storico-culturale e paesaggistico*>> (Ministero della Cultura, 2023). Il possesso di tali requisiti era la *conditio sine qua non* per parteciparvi.
Una caratteristica comune sia ai requisiti del Bando, che a quelli per entrare in uno dei circuiti di eccellenza prima menzionati, è il requisito che il Comune richiedente abbia meno di 5.000 abitanti. I comuni sotto i 5.000 abitanti, definiti "piccoli comuni", sono spesso oggetto di studi ed analisi sociodemografiche, nonché beneficiari di bandi nazionali e locali ad hoc, in quanto soggetti a fenomeni di spopolamento.

- ***Analisi del caso studio di Montecreto**: la seconda fase della ricerca ha previsto l'analisi di un caso studio: il borgo di Montecreto, situato nell'Alto Appennino in Provincia di Modena. Tale borgo è stato selezionato come caso studio per la sua recente strategia di attrazione di nomadi digitali attraverso l'implementazione di una strategia turistica frutto del progetto di riqualificazione turistica e territoriale "Montecreto Reboot" finanziato tramite il Bando Borghi - Linea B del PNRR. Grazie a questo progetto, il Comune ha incaricato una società di consulenza in Destination Management, di elaborare e implementare la strategia turistica del territorio. Il caso studio è stato analizzato attraverso il modello proposto da Thomas & McNeice (2022) che combina approcci di Destination Management e design partecipativo per valutare la metodologia di lavoro applicata nei processi partecipativi e l'impatto delle strategie sul territorio. La ricerca si è avvalsa di molteplici metodi e strumenti di analisi come di seguito indicato:*
  1. ***Osservazione partecipante:** coinvolgimento in prima persona di uno dei ricercatori nel ruolo di project manager del progetto di valorizzazione territoriale tra, con partecipazione attiva nei processi decisionali e nelle attività di co-progettazione (periodo: giugno 2023 - marzo 2024).*
  2. ***Interviste semi-strutturate e somministrazione questionari**: sono state condotte interviste semi-strutturate con stakeholder locali (amministratori pubblici, operatori turistici e residenti) (29 interviste tra giugno 2023 e novembre 2023) e somministrati questionari agli operatori turistici locali (es. gestori di hotel, ristoranti, guide turistiche, etc.) per approfondire le percezioni sul fenomeno e valutare l'efficacia delle strategie implementate (32 questionari raccolti nel periodo tra giugno 2023 e novembre 2023).*
  3. ***Tavoli di co-progettazione:** sono stati organizzati quattro tavoli di co-progettazione, ciascuno affiancato da un incontro formativo aperto all'intera comunità locale. Durante questi incontri sono state discusse e sviluppate strategie per il territorio, articolate in quattro ambiti chiave: accoglienza, offerta turistica, comunicazione e promo-commercializzazione (55 stakeholder convolti nel periodo tra settembre 2023 – gennaio 2024).*
  4. ***Analisi documentale**: sono stati esaminati documenti strategici, il piano strategico di destinazione e i documenti interni relativi alle attività svolte per attrarre nomadi digitali (periodo: gennaio 2024-dicembre 2024).*

La metodologia adottata ha permesso di integrare i dati emersi dall'applicazione dell'indicatore DNAI, con un'analisi contestualizzata ad uno specifico territorio. La ricerca ha fornito un'analisi approfondita sia dei fattori strutturali che influenzano l'attrattività dei borghi, sia delle dinamiche locali che determinano il successo delle strategie di valorizzazione territoriale.

Risultati. *I risultati della ricerca offrono una panoramica dettagliata sull'attrattività dei borghi italiani per i nomadi digitali e sulle strategie di valorizzazione territoriale adottate per intercettare questo segmento emergente. L'analisi condotta attraverso l'applicazione del Digital Nomads Attractiveness Index (DNAI) e lo studio qualitativo del caso di Montecreto evidenzia tendenze significative e fornisce spunti concreti per il Destination Management. L'applicazione del DNAI ai 1.825 borghi italiani (analisi quantitativa) ha permesso di elaborare un ranking nazionale basato su un punteggio di attrattività compreso tra 0 e 100. I principali risultati emersi evidenziano quanto segue:*

- ***Caratteristiche dei borghi più attrattivi**: i borghi italiani con i punteggi più alti sono localizzati prevalentemente nelle aree del Nord-Est, caratterizzate da un elevato livello di attività ricreative, infrastrutture digitali adeguate e offerta di spazi di coworking. La classe di comune più attrattiva è l'Area ultra-periferica; la zona altimetrica con un punteggio complessivo più alto riguarda la montagna litoranea e la montagna interna. Rispetto alla categoria turistica prevalente, i Comuni a vocazione montana e con vocazione culturale, storica, artistica e paesaggistica sono quelli con un punteggio più alto.*
- ***Analisi cluster**: l'analisi ha individuato cinque cluster principali di borghi italiani:*
  1. *"Borghi flex hubs": situati in aree accessibili del Centro-Nord, attraggono nomadi digitali per il basso costo e la buona mobilità, ma offrono pochi spazi di coworking.*
  2. *"Borghi luxury": localizzati in zone lacuali con alta qualità della vita, attraggono per l'offerta culturale ma hanno costi elevati e scarsa accessibilità.*
  3. *"Borghi smart": connettività e spazi di coworking ben sviluppati li rendono ideali per lavoratori remoti, nonostante un'offerta turistica limitata.*
  4. *"Borghi natural active": destinazioni rurali e montane con forte attrattività naturalistica e culturale, ma con difficoltà di accesso e trasporto; tale cluster presenta anche il punteggio di DNAI medio più alto.*
  5. *"Borghi detox": localizzati in aree marittime o collinari, offrono tranquillità a costi contenuti, ma con infrastrutture digitali e turistiche limitate.*
- ***Evidenze emerse dal caso studio:** la ricerca ha esplorato l'efficacia delle strategie di valorizzazione territoriale basate sul destination design. I principali risultati evidenziano:*
  - ***Incremento dell'attrattività**: grazie agli interventi realizzati tra il 2023 e il 2024 (come il potenziamento della rete Wi-Fi pubblica, la creazione di spazi di coworking e l'attivazione di nuovi servizi turistici), il punteggio DNAI di Montecreto è passato da 55,24 a 61,48 collocando il borgo tra il primo quartile del campione di borghi italiani per punteggio di attrattività.*
  - ***Coinvolgimento della comunità**: il processo di co-progettazione ha favorito un forte coinvolgimento degli stakeholder locali. Le interviste condotte e i questionari erogati evidenziano come residenti e operatori turistici percepiscano positivamente l'attrazione di smart workers e nomadi digitali, soprattutto per la destagionalizzazione della domanda turistica e l'apertura di nuove attività economiche. Inoltre, ciò ha stimolato un'iniziativa privata nell'apertura di nuovi servizi, come lo spazio di coworking.*

Questi risultati offrono una base solida per sviluppare ulteriori ricerche sul nomadismo digitale e il suo impatto sui territori, nonché per supportare amministrazioni locali e operatori turistici nell'elaborazione di strategie di valorizzazione sostenibile.

Limiti della ricerca. *Pur offrendo un contributo significativo alla comprensione dell'attrattività dei borghi italiani per i nomadi digitali e alle strategie di valorizzazione territoriale, la ricerca presenta alcune limitazioni che devono essere considerate per una corretta interpretazione dei risultati e come spunti per future ricerche. Il DNAI è uno strumento innovativo per misurare l'attrattività dei borghi, ma presenta alcune criticità legate alla selezione e alla disponibilità dei dati:*

- ***Parametri quantitativi predominanti**: l'indice si basa prevalentemente su dati oggettivi (costo della vita, connettività, spazi di coworking, ecc.) trascurando fattori qualitativi come l'immagine percepita e/o promossa della destinazione o le esperienze soggettive dei nomadi digitali, che possono influenzare significativamente le scelte di viaggio.*
- ***Limiti di aggiornamento dei dati e delle dimensioni**: alcune fonti utilizzate (es. dati ISTAT o di enti locali) potrebbero non riflettere cambiamenti recenti nelle infrastrutture o nei servizi dei borghi, influenzando l'accuratezza dell'indice. Inoltre, essendo un fenomeno recente e in continua evoluzione, i parametri e i pesi scelti potrebbero non essere validi nei prossimi anni.*
- ***Esclusione di alcune dimensioni**: la fase di standardizzazione dei dati ha portato all'eliminazione della dimensione "comunità di nomadi digitali" (presente nel framework "7layers" proposto dal DNO), una variabile potenzialmente rilevante per valutare l'attrattività sociale di una destinazione.*
- ***Focus geografico limitato**: sebbene il DNAI sia stato applicato a un campione esteso di borghi italiani, l'approfondimento di come l'adozione di un approccio partecipato allo sviluppo turistico territoriale possa incidere sull'attrattività dei borghi per i nomadi digitali (e quindi sull'andamento dell'indice) è stato osservato limitatamente ad un caso studio (il borgo di Montecreto). Questo limita la rappresentatività dei risultati, poiché le dinamiche emerse potrebbero non essere replicabili in contesti territoriali che presentano caratteristiche (socio-economiche e/o infrastrutturali) diverse.*
- ***Segmentazione dei nomadi digitali**: la ricerca considera i nomadi digitali come un segmento omogeneo, ma la letteratura evidenzia la presenza di sottogruppi con esigenze e comportamenti differenti (Hermann & Paris, 2020; Cook, 2023). Approfondire le preferenze di questi sottogruppi potrebbe offrire una visione più precisa delle opportunità di valorizzazione territoriale.*
- ***Limiti legati al caso studio**: il caso studio di Montecreto è stato analizzato in una fase intermedia di sviluppo (2023-2024), pertanto alcune iniziative potrebbero non aver ancora manifestato appieno i loro effetti sul territorio, limitando la valutazione di lungo periodo delle strategie implementate.*

Implicazioni manageriali. *I risultati della ricerca offrono numerosi spunti di riflessione per i decisori pubblici, i destination manager, gli operatori turistici e le comunità locali interessate a valorizzare i borghi italiani attraverso l'attrazione dei nomadi digitali. L'approccio integrato tra analisi quantitativa e qualitativa evidenzia strategie e azioni operative che possono supportare lo sviluppo sostenibile di queste destinazioni emergenti.*

- ***Sviluppo di strategie territoriali basate sui dati:** l'adozione di strumenti come il DNAI consente ai manager pubblici e privati di effettuare analisi basate su dati oggettivi per individuare punti di forza e debolezza delle destinazioni rispetto alle esigenze dei nomadi digitali. I risultati del DNAI permettono di pianificare interventi mirati su specifiche dimensioni carenti (es. miglioramento della connettività, creazione di spazi di coworking, potenziamento dei trasporti), ottimizzando l'allocazione delle risorse e massimizzando l'impatto delle strategie di attrazione.*
- ***Pianificazione sostenibile e destagionalizzazione dell'offerta turistica**: il nomadismo digitale rappresenta un'opportunità per contrastare la stagionalità turistica, incentivando soggiorni medio-lunghi anche in periodi di bassa stagione.*
- ***Coinvolgimento delle comunità locali e approcci partecipativi**: l'esperienza del borgo di Montecreto dimostra l'importanza di adottare approcci partecipativi nella progettazione delle strategie di attrazione. Coinvolgere attivamente i residenti e gli operatori locali nei processi decisionali favorisce l'accettazione del fenomeno e contribuisce a creare un'offerta turistica autentica e coerente con le esigenze del territorio. Workshop, eventi di community building e attività di co-progettazione possono facilitare l'integrazione tra nomadi digitali e comunità ospitanti, riducendo il rischio di conflitti sociali e promuovendo la coesione.*
- ***Innovazione dell'offerta e sviluppo di nuovi servizi**: l'analisi evidenzia come i borghi che investono in infrastrutture digitali e servizi specifici per i nomadi digitali ottengano risultati migliori in termini di attrattività. Creare spazi di coworking, potenziare la rete Wi-Fi pubblica, offrire servizi di networking e mentorship sono elementi chiave per attrarre e fidelizzare questo segmento. Inoltre, l'offerta può essere arricchita con attività che valorizzino le risorse locali (es. laboratori artigianali, corsi di cucina tipica, escursioni naturalistiche, etc.) e promuovano uno stile di vita equilibrato tra lavoro e benessere.*
- ***Gestione dei rischi**: sebbene il nomadismo digitale rappresenti un'opportunità di sviluppo, è fondamentale che i decisori locali pongano attenzione ai potenziali rischi, come la gentrificazione o l'aumento dei costi per i residenti. Implementare politiche di gestione del territorio che preservino l'accessibilità abitativa per le comunità locali, garantiscano il rispetto della capacità di carico delle destinazioni e promuovano pratiche sostenibili è essenziale per mantenere l'equilibrio tra sviluppo economico e benessere sociale.*

- ***Comunicazione territoriale e marchi di qualità:*** *la promozione delle destinazioni deve essere orientata a evidenziare i vantaggi competitivi per i nomadi digitali, come l'equilibrio tra lavoro e qualità della vita, la presenza di comunità accoglienti e la possibilità di vivere esperienze autentiche. strategie di marketing mirate, campagne social e storytelling basati su testimonianze di altri nomadi digitali possono rafforzare l'attrattività del borgo e posizionarlo come remote work-friendly. Inoltre, la creazione di marchi di qualità che certifichino i requisiti necessari per attrarre i nomadi digitali, potrebbero favorire una comunicazione trasparente e informativa, nonché stimolare le destinazioni a migliorare i propri servizi per adeguarsi a determinati standard.*

Originalità del paper. *Questo studio si distingue per il contributo innovativo al dibattito scientifico sul nomadismo digitale e sul destination management, proponendo un approccio metodologico integrato e strumenti originali per analizzare e valorizzare l'attrattività dei borghi italiani. L'originalità di questo studio risiede nella combinazione di innovazione metodologica, contributi teorici e rilevanza pratica. La ricerca non solo approfondisce la comprensione del fenomeno del nomadismo digitale, da una prospettiva turistica, ma propone anche strumenti e strategie concrete per supportare lo sviluppo sostenibile dei borghi italiani.*

Key words: *nomadismo digitale; destination management; destination design; borghi italiani; turismo sostenibile; workation*

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La digitalizzazione delle collezioni d'arte moderna e contemporanea in Italia

ENRICO CRISAFULLI[1]

Abstract

La crescente terziarizzazione dell'economia ha avuto un impatto significativo sulle istituzioni culturali, in particolare sui musei, che si trovano sempre più spesso a dover integrare servizi digitali per migliorare l'accessibilità, ampliare il coinvolgimento del pubblico e ottimizzare la gestione delle proprie collezioni. La digitalizzazione non è solo un'opportunità tecnologica, ma rappresenta un motore chiave dell'innovazione nel settore culturale, con implicazioni che spaziano dalla conservazione e valorizzazione del patrimonio alla sostenibilità economica delle istituzioni museali (Bertacchini e Morando, 2013). Tuttavia, nonostante il potenziale trasformativo delle tecnologie digitali (Antinucci, 2007), la loro implementazione nel contesto museale rimane spesso frammentata e disomogenea, a causa di vincoli economici, organizzativi e tecnologici (Corte dei Conti, 2022).

Questo studio si propone di esaminare in dettaglio gli sforzi di digitalizzazione messi in atto dalle istituzioni italiane che gestiscono collezioni di arte moderna e contemporanea, mettendo in luce sia le sfide che le opportunità connesse all'integrazione delle tecnologie digitali nei servizi museali. Attraverso l'analisi delle risposte fornite al questionario somministrato a 75 istituzioni - tra cui musei, gallerie, fondazioni e case museo - questa ricerca intende fornire un quadro complessivo della trasformazione digitale nel settore culturale, contestualizzandolo all'interno delle più ampie dinamiche di innovazione nei servizi. L'attenzione è rivolta non solo agli strumenti e alle strategie adottate per la digitalizzazione delle collezioni, ma anche alle modalità di fruizione dei contenuti digitali da parte del pubblico e alle implicazioni che questi cambiamenti comportano per il modello di sostenibilità economica delle istituzioni museali.

Poiché la ricerca è ancora in corso, il presente contributo si concentra sull'elaborazione e l'interpretazione dei risultati preliminari, individuando le principali tendenze emerse dall'analisi dei dati e suggerendo possibili direzioni per futuri approfondimenti. Verranno, inoltre, discusse le criticità riscontrate dalle istituzioni nel processo di digitalizzazione, le risorse impiegate e le strategie adottate per superare gli ostacoli, nonché le prospettive future per un utilizzo più efficace e diffuso delle tecnologie digitali nel settore museale.

Framework teorico. *Questo studio si inserisce nel più ampio dibattito sull'innovazione nei servizi e sulla trasformazione digitale nel settore culturale, offrendo una prospettiva approfondita sulle sfide e le opportunità connesse alla digitalizzazione museale. Esaminando le dimensioni economiche e organizzative della digitalizzazione nei musei, la ricerca mette in luce non solo le disparità esistenti tra istituzioni di diversa scala e capacità di investimento, ma anche il ruolo cruciale che strategie integrate e approcci sistemici possono avere nel facilitare la digitalizzazione nelle arti. Questa, infatti, non si limita a essere un processo tecnico, ma rappresenta un cambiamento paradigmatico che ridefinisce le modalità di interazione tra le istituzioni culturali e il loro pubblico, trasformando l'esperienza di fruizione e ampliando le possibilità di accesso ai contenuti artistici e storici.*

Obiettivi della ricerca. *La ricerca si propone di raggiungere i seguenti obiettivi principali:*

- *Valutare il livello di digitalizzazione tra le istituzioni italiane che gestiscono collezioni di arte moderna e contemporanea, analizzando la diffusione e l'effettivo utilizzo di strumenti digitali per la catalogazione, la fruizione online, l'interazione con il pubblico e la gestione operativa. L'indagine mira a comprendere in che misura la trasformazione digitale abbia già avuto luogo e quali siano i margini di sviluppo futuri;*
- *Analizzare i fattori determinanti della digitalizzazione, con particolare attenzione a variabili quali le risorse finanziarie disponibili, le strategie adottate dalle istituzioni, il livello di competenza digitale del personale e la qualità delle infrastrutture tecnologiche. Questo approccio consente di individuare le principali barriere e facilitatori nel processo di transizione digitale, evidenziando differenze tra istituzioni di diverse dimensioni e tipologie;*
- *Esaminare l'impatto della digitalizzazione su diversi aspetti della gestione museale, dal coinvolgimento dei visitatori all'efficacia organizzativa interna. In particolare, lo studio si interroga su come le innovazioni digitali possano migliorare l'esperienza del pubblico, favorendo nuove forme di partecipazione e interazione, e su come esse possano contribuire all'ottimizzazione delle operazioni amministrative e curatoriali;*
- *Identificare le migliori pratiche e formulare raccomandazioni politiche per supportare la transizione digitale delle istituzioni culturali, con un'attenzione specifica a quelle di dimensioni più ridotte. L'analisi dei dati raccolti*

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permetterà di individuare modelli virtuosi e strategie efficaci, offrendo indicazioni utili per lo sviluppo di politiche pubbliche e iniziative di sostegno alla digitalizzazione nel settore museale.

Metodologia. *Per condurre un'analisi approfondita sullo stato della digitalizzazione delle collezioni nei musei di arte moderna e contemporanea, è stato adottato un approccio quantitativo basato sulla somministrazione di un questionario strutturato. Questo strumento di ricerca è stato progettato per raccogliere dati dettagliati sulle strategie digitali adottate dalle istituzioni, sulle risorse disponibili, sulle principali sfide affrontate nel processo di digitalizzazione e sull'impatto che l'innovazione tecnologica ha avuto sulla gestione museale e sull'esperienza dei visitatori.*

Il questionario è stato inviato a un totale di 330 istituzioni museali, distribuite su tutto il territorio nazionale, selezionate in base alla loro rilevanza rispetto all'oggetto di studio, ovvero la gestione delle collezioni d'arte dalla seconda metà dell'Ottocento fino ai giorni nostri. La selezione è stata effettuata attraverso un'attenta analisi delle istituzioni che possiedono e gestiscono collezioni coerenti con il focus della ricerca, includendo musei pubblici e privati, gallerie, fondazioni e case museo, grazie a piattaforme come "Luoghi del Contemporaneo" e la piattaforma dei luoghi della cultura della Direzione Generale Musei.

Nonostante le numerose sollecitazioni, tra cui l'invio ripetuto via e-mail e un'intensa attività di follow-up telefonico per incentivare la partecipazione, la ricerca ha ottenuto 75 risposte, di cui 5 sono state scartate a causa dell'incompletezza dei dati forniti o per la mancata pertinenza rispetto ai criteri definiti per l'indagine. Il campione finale su cui si basa l'analisi è quindi composto da 70 istituzioni culturali, che rappresentano un segmento significativo del panorama museale italiano dedicato all'arte moderna e contemporanea.

Il questionario è stato progettato per raccogliere informazioni dettagliate su molteplici aspetti della gestione museale, con un focus specifico sui processi di digitalizzazione. La struttura del questionario è articolata in quattro macro-sezioni, ciascuna delle quali mira a esplorare un ambito chiave della digitalizzazione e della gestione istituzionale delle collezioni:

1. *Anagrafica dell'ente e gestione istituzionale: questa sezione raccoglie dati fondamentali sull'istituzione rispondente, tra cui la natura giuridica, la localizzazione geografica e la tipologia di collezione gestita. Inoltre, include domande relative alla gestione economica, con particolare attenzione alle fonti di finanziamento, alla sostenibilità economica e alle eventuali strategie di fundraising adottate per supportare lo sviluppo e l'innovazione digitale;*
2. *Digitalizzazione delle collezioni: analizza in dettaglio lo stato dell'arte del processo di digitalizzazione, raccogliendo informazioni su percentuali di opere digitalizzate, tipologie di contenuti digitalizzati, modalità di archiviazione e livello di accessibilità dei materiali digitalizzati. Un focus particolare è riservato alle risorse impiegate e ai finanziamenti ricevuti, per comprendere meglio le capacità e i limiti delle istituzioni nel portare avanti progetti di digitalizzazione su larga scala;*
3. *Modalità di digitalizzazione delle collezioni: questa sezione approfondisce gli strumenti e le tecnologie adottati nel processo di digitalizzazione, indagando l'uso di software e hardware specifici, le procedure di gestione dei file digitali, le strategie per garantire la conservazione a lungo termine e la compatibilità tra diversi formati e piattaforme;*
4. *Fruizione dei contenuti digitalizzati da parte degli utenti: in questa parte del questionario si esplorano le modalità di coinvolgimento del pubblico con i contenuti digitalizzati, esaminando le strategie di comunicazione, le attività partecipative e le interazioni tra gli utenti e le collezioni digitali. Viene inoltre indagato il ruolo degli strumenti digitali nella valorizzazione delle collezioni, nell'engagement online e nel loro potenziale impatto sulle visite fisiche ai musei.*

Il questionario è stato strutturato per combinare sia domande chiuse (a scelta multipla e con stime percentuali), che permettono una comparabilità standardizzata dei dati, sia domande aperte, che offrono ai rispondenti la possibilità di aggiungere dettagli qualitativi ed espandere le proprie risposte su aspetti specifici.

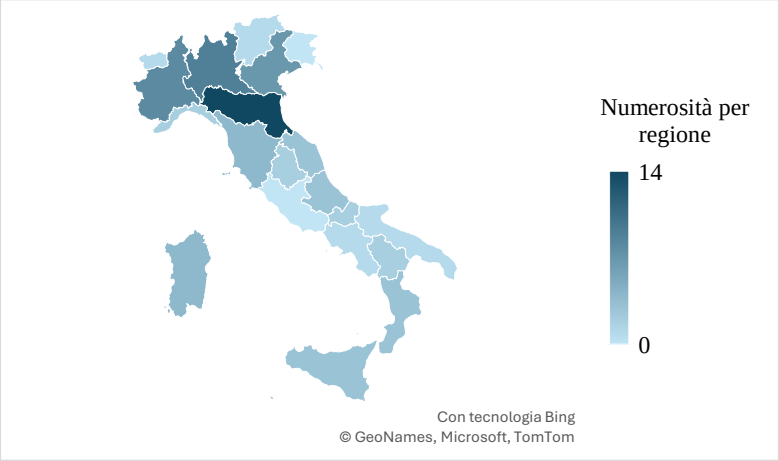
Complessivamente, il questionario comprende 60 quesiti, a cui si aggiunge uno spazio finale dedicato a riflessioni e commenti, offrendo ai partecipanti l'opportunità di esprimere considerazioni aggiuntive sulla loro esperienza con la digitalizzazione e sulle sfide future.

Risultati preliminari. *I risultati del questionario indicano che, sebbene molte istituzioni abbiano avviato progetti di digitalizzazione, solo una piccola percentuale ha digitalizzato più della metà delle proprie collezioni, e ancora meno hanno reso questi archivi digitali accessibili al pubblico. Questo scenario riflette un'adozione disomogenea delle strategie digitali, spesso influenzata dalle dimensioni e dalle risorse disponibili. Le istituzioni più grandi, con maggiori capacità finanziarie e tecniche, sono in una posizione più favorevole per implementare strategie digitali complete, mentre le realtà più piccole affrontano ostacoli economici e infrastrutturali significativi. L'assenza di una strategia digitale condivisa nel settore, nonostante la pubblicazione del Piano Nazionale di Digitalizzazione del patrimonio culturale (Digital Library, 2022), limita il pieno potenziale dei servizi digitali nel miglioramento dell'accessibilità culturale e dell'interazione con il pubblico. Quest'ultimo documento, infatti, non fornisce indicazioni operative benché corredato da linee guida per la standardizzazione dei processi.*

Profilo istituzionale e tipologia delle collezioni

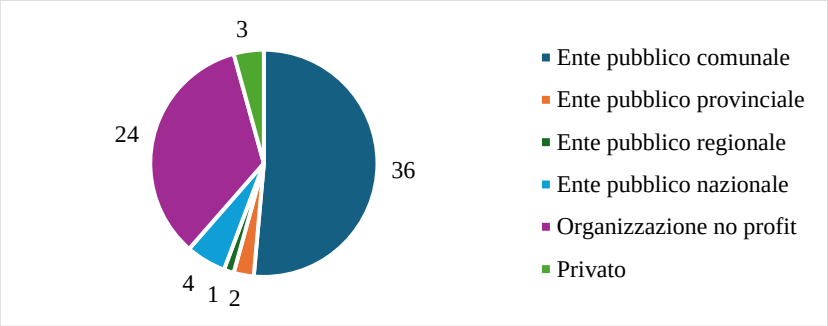
I rispondenti si distribuiscono in modo relativamente uniforme sul territorio nazionale, ad eccezione di una prevalenza di istituzioni situate in Emilia-Romagna (20%). La maggior parte delle istituzioni partecipanti all'indagine sono enti pubblici comunali (36 su 70), seguiti da organizzazioni no profit (24), mentre le altre categorie istituzionali, come enti pubblici nazionali, provinciali e regionali, risultano numericamente meno rilevanti. Le collezioni gestite sono prevalentemente miste (35,7%) o composte esclusivamente da arte contemporanea (34,3%), mentre una minoranza include opere sia moderne sia contemporanee (24,3%) o solo moderne (5,7%).

Grafico 1. Distribuzione degli enti rispondenti sul territorio nazionale. Elaborazione propria



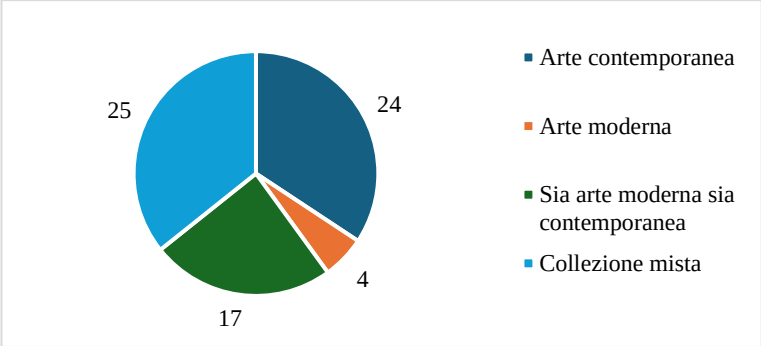
Regione	*Numerosità assoluta*	*Numerosità relativa*
Abruzzo	*3*	*4,3%*
Basilicata	*2*	*2,9%*
Calabria	*3*	*4,3%*
Campania	*1*	*1,4%*
Emilia-Romagna	*14*	*20,0%*
Friuli-Venezia-Giulia	*0*	*0,0%*
Lazio	*0*	*0,0%*
Liguria	*2*	*2,9%*
Lombardia	*9*	*12,9%*
Marche	*3*	*4,3%*
Molise	*2*	*2,9%*
Piemonte	*8*	*11,4%*
Puglia	*1*	*1,4%*
Sardegna	*4*	*5,7%*
Sicilia	*3*	*4,3%*
Toscana	*4*	*5,7%*
Umbria	*2*	*2,9%*
Valle d'Aosta	*1*	*1,4%*
Veneto	*7*	*10,0%*
Trentino-Alto Adige	*1*	*1,4%*

Grafico 2. Natura giuridica dell'ente. Elaborazione propria.



Natura giuridica dell'ente	*Numerosità assoluta*	*Numerosità relativa*
Ente pubblico comunale	*36*	*51,4%*
Ente pubblico provinciale	*2*	*2,9%*
Ente pubblico regionale	*1*	*1,4%*
Ente pubblico nazionale	*4*	*5,7%*
Organizzazione no profit	*24*	*34,3%*
Privato	*3*	*4,3%*

Grafico 3. Tipologia delle collezioni degli enti. Elaborazione propria.



Tipologia della collezione	*Numerosità assoluta*	*Numerosità relativa*
Arte contemporanea	*24*	*34,3%*
Arte moderna	*4*	*5,7%*
Sia arte moderna sia contemporanea	*17*	*24,3%*
Collezione mista	*25*	*35,7%*

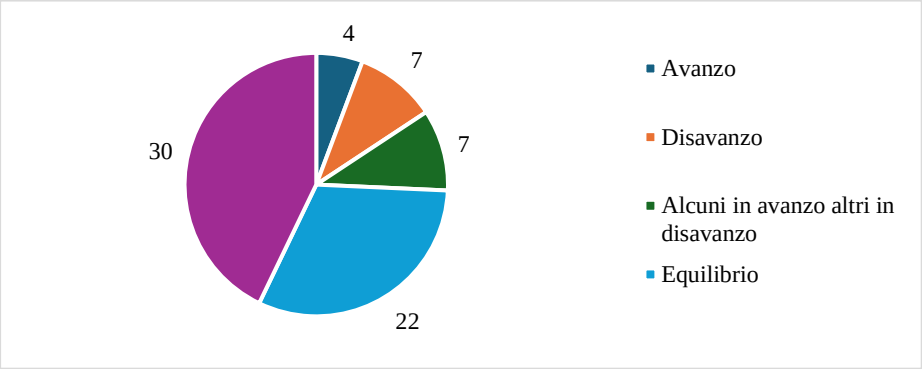
Livello di digitalizzazione delle collezioni

In media, sebbene le istituzioni dichiarino di aver digitalizzato il 68% delle opere di arte moderna e contemporanea della propria collezione, il dato presenta una significativa varianza (1225,63; deviazione standard 35). Questo suggerisce una notevole eterogeneità tra gli istituti, con alcuni che hanno raggiunto un elevato grado di digitalizzazione e altri che sono ancora in una fase iniziale del processo. La dimensione media delle collezioni permanenti ammonta a circa 7.200 opere, mentre il numero di mostre temporanee realizzate negli ultimi tre anni varia notevolmente: in media sono più di 9, ma con casi estremi tra chi non ne ha organizzate e chi ne ha realizzate più di 20 nel periodo 2021-2023.

Situazione economica e sostenibilità finanziaria

Uno degli aspetti più critici riguarda la sostenibilità economica delle istituzioni: sebbene una parte significativa dei rispondenti abbia dichiarato di aver chiuso gli ultimi tre anni di esercizio in equilibrio (31,4%), il 20% ha registrato disavanzi in almeno un anno del triennio analizzato. Solo quattro istituzioni hanno riportato un utile costante. La raccolta di dati su costi e ricavi ha evidenziato una generale reticenza alla condivisione di queste informazioni, nonostante fossero richieste in forma percentuale rispetto alle voci di bilancio.

Grafico 4. Chiusura del bilancio negli esercizi economico-finanziari 2021-2023. Elaborazione propria

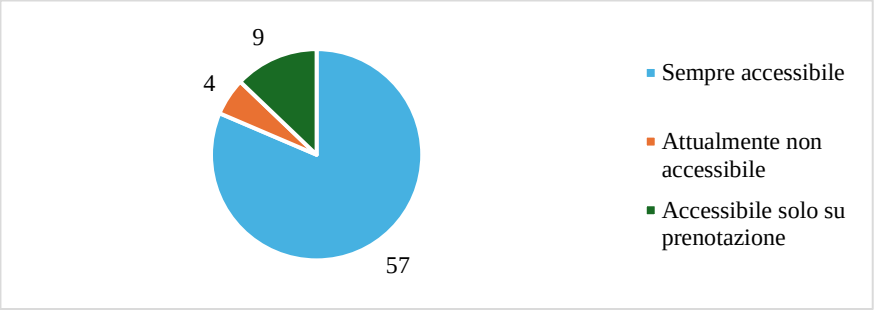


Chiusura di bilancio (2021-2023)	*Numerosità assoluta*	*Numerosità relativa*
Avanzo	*4*	*5,7%*
Disavanzo	*7*	*10,0%*
Alcuni in avanzo altri in disavanzo	*7*	*10,0%*
Equilibrio	*22*	*31,4%*

Modelli di accesso e fundraising

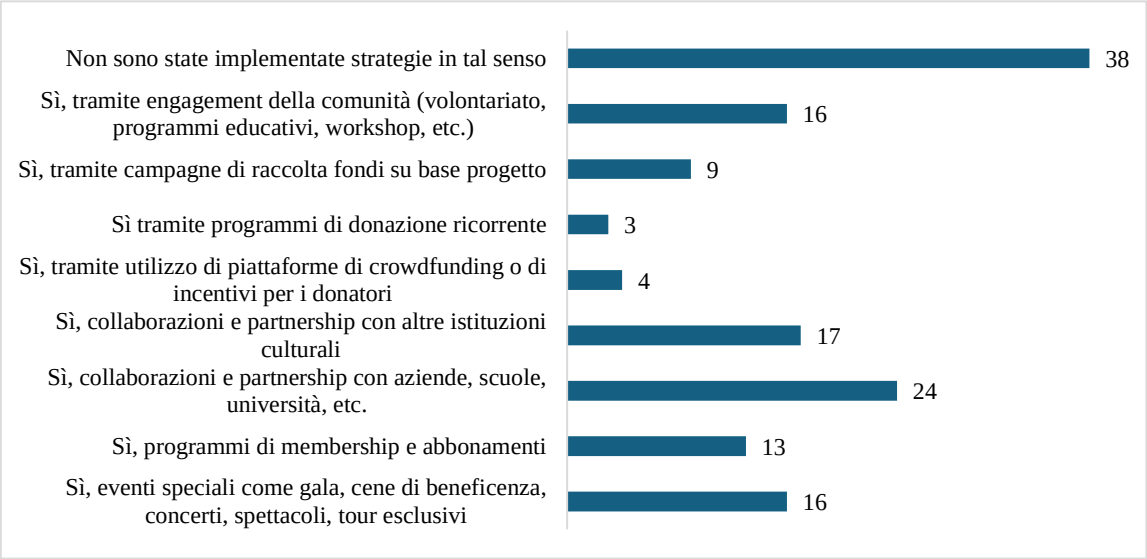
I musei analizzati adottano politiche di accesso variegate: alcuni sono gratuiti, mentre altri applicano tariffe che possono arrivare fino a 25 euro per un biglietto intero, con una media di 5,4 euro e una varianza piuttosto elevata (31,2). L'81% degli istituti è regolarmente aperto al pubblico, mentre il 19% è temporaneamente chiuso o accessibile solo in occasioni particolari. La metà dei rispondenti ha organizzato eventi di fundraising o crowdfunding, utilizzando strategie diversificate tra eventi speciali, programmi di membership, collaborazioni con enti pubblici e privati e campagne di raccolta fondi.

Grafico 5. Attuale accessibilità dell'ente al pubblico. Elaborazione propria.



Accessibilità	*Numerosità assoluta*	*Numerosità relativa*
Sempre accessibile	*57*	*81,4%*
Attualmente non accessibile	*4*	*5,7%*
Accessibile solo su prenotazione	*9*	*12,9%*

Grafico 6. Gestione delle campagne di crowdfunding e fundraising degli istituti. Elaborazione propria.

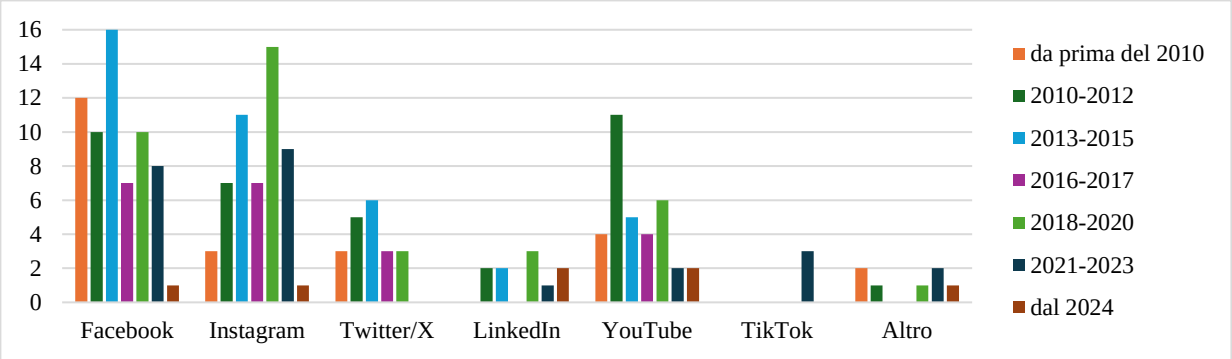


Strumenti di raccolta fondi utilizzati	*Numerosità assoluta*	*Numerosità relativa*
Sì, eventi speciali come gala, cene di beneficenza, concerti, spettacoli, tour esclusivi	*16*	*22,9%*
Sì, programmi di membership e abbonamenti	*13*	*18,9%*
Sì, collaborazioni e partnership con aziende, scuole, università, etc.	*24*	*34,3%*
Sì, collaborazioni e partnership con altre istituzioni culturali	*17*	*24,3%*
Sì, tramite utilizzo di piattaforme di crowdfunding o di incentivi per i donatori	*4*	*5,7%*
Sì tramite programmi di donazione ricorrente	*3*	*4,3%*
Sì, tramite campagne di raccolta fondi su base progetto	*9*	*12,9%*
Sì, tramite engagement della comunità (volontariato, programmi educativi, workshop, etc.)	*16*	*22,9%*
Non sono state implementate strategie in tal senso	*38*	*54,3%*

Strategie di engagement della comunità

L'analisi delle strategie di comunicazione e coinvolgimento del pubblico evidenzia un uso diffuso degli strumenti digitali: il 93% degli istituti utilizza i social media, il 75% ricorre a materiale cartaceo e il 69% sfrutta newsletter per aggiornare il pubblico. Tuttavia, solo il 19% delle istituzioni ha effettuato una stima dell'impatto sociale ed economico del museo sulla comunità locale, suggerendo una scarsa attenzione alla valutazione sistematica delle proprie attività in termini di ritorni territoriali. Il coinvolgimento con i social media è pervasivo: solo cinque istituzioni dichiarano di non possedere alcun account, mentre l'81% ne gestisce almeno due tra Facebook, Instagram, Twitter/X, LinkedIn, YouTube e TikTok.

Grafico 7. Principali account social di cui gli enti sono titolari. Elaborazione propria.

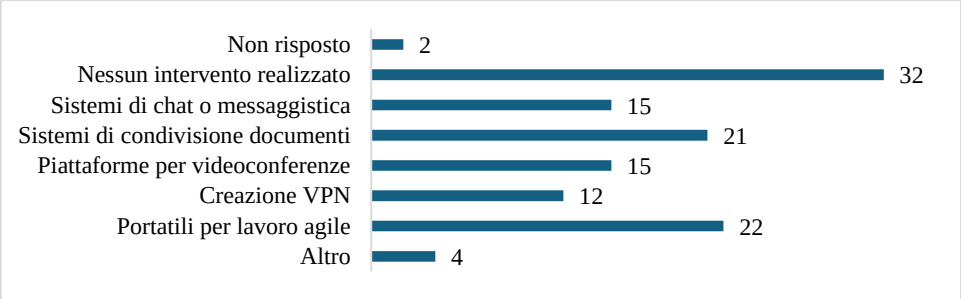


Social network	*Non presente*	*Da prima del 2010*	*2010-2012*	*2013-2015*	*2016-2017*	*2018-2020*	*2021-2023*	*Dal 2024*
Facebook	*6*	*12*	*10*	*16*	*7*	*10*	*8*	*1*
Instagram	*17*	*3*	*7*	*11*	*7*	*15*	*9*	*1*
Twitter/X	*50*	*3*	*5*	*6*	*3*	*3*	*0*	*0*
LinkedIn	*60*	*0*	*2*	*2*	*0*	*3*	*1*	*2*
YouTube	*36*	*4*	*11*	*5*	*4*	*6*	*2*	*2*
TikTok	*67*	*0*	*0*	*0*	*0*	*0*	*3*	*0*
Altro	*63*	*2*	*1*	*0*	*0*	*1*	*2*	*1*

Investimenti in infrastrutture digitali e lavoro agile

La transizione digitale interna è stata affrontata in modo disomogeneo: il 44% degli istituti non ha effettuato investimenti in infrastrutture digitali per il lavoro agile, mentre 22 hanno acquistato portatili (31%) e 21 hanno implementato sistemi di condivisione documentale (30%). Questo indica che, sebbene alcune istituzioni abbiano avviato processi di modernizzazione tecnologica, quasi la metà dei rispondenti non ha ancora intrapreso iniziative strutturali in questo ambito.

Grafico 8. Investimenti realizzati per digitalizzazione interna. Elaborazione propria.



Investimenti per digitalizzazione interna	*Numerosità assoluta*	*Numerosità relativa*
Non risposto	*2*	*2,9%*
Nessun intervento realizzato	*32*	*45,7%*
Sistemi di chat o messaggistica	*15*	*21,4%*
Sistemi di condivisione documenti	*21*	*30,0%*
Piattaforme per videoconferenze	*15*	*21,4%*
Creazione di VPN	*12*	*17,1%*
Portatili per lavoro agile	*22*	*31,4%*
Altro	*4*	*5,7%*

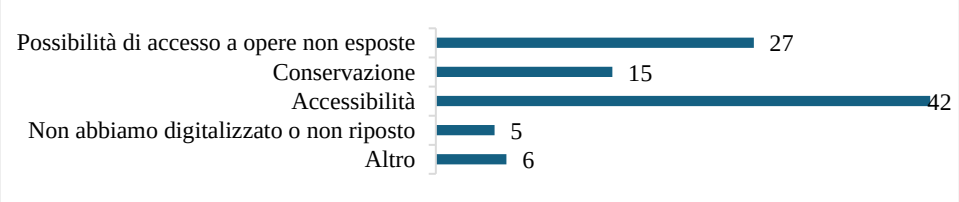
Processi di digitalizzazione delle collezioni

Le opere più frequentemente digitalizzate appartengono alle categorie della pittura (35%) e della scultura (26%). Le risorse economiche destinate alla digitalizzazione si suddividono in costi per il personale interno (25%), servizi esterni (32%) e altre spese, come trasporto e assicurazioni (11%). Tuttavia, il 63% delle istituzioni dichiara di non aver coinvolto figure professionali specifiche per i progetti di digitalizzazione, mentre il restante 37% ha collaborato con specialisti, fra i quali digital humanists, informatici, catalogatori, operatori tecnici, art handlers e conservatori.

Fonti di finanziamento per la digitalizzazione

Il 34% degli istituti ha ricevuto finanziamenti esterni per sostenere i costi della digitalizzazione, principalmente da enti pubblici nazionali, ma anche attraverso progetti dell'Unione Europea o sponsorizzazioni private. Tra i benefici riportati dai musei che hanno intrapreso iniziative di digitalizzazione, emergono una maggiore accessibilità ai contenuti digitali, la possibilità di valorizzare opere non esposte al pubblico e, in misura minore, il miglioramento della conservazione digitale.

Grafico 9. Principali motivazioni alla digitalizzazione. Elaborazione propria.

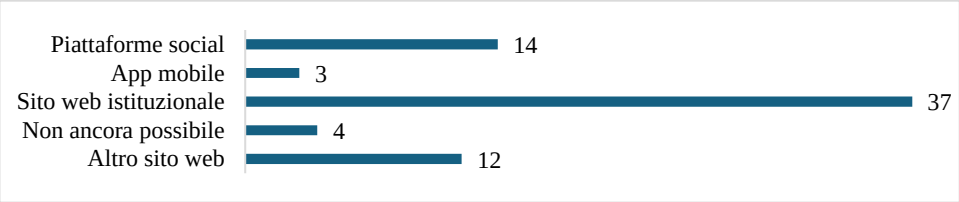


Motivazioni alla digitalizzazione	*Numerosità assoluta*	*Numerosità relativa*
Possibilità di accesso a opere non esposte	*27*	*38,6%*
Conservazione	*15*	*21,4%*
Accessibilità	*42*	*60,0%*
Non abbiamo digitalizzato o non risposto	*5*	*7,1%*
Altro	*6*	*8,9%*

Standard e accessibilità dei contenuti digitalizzati

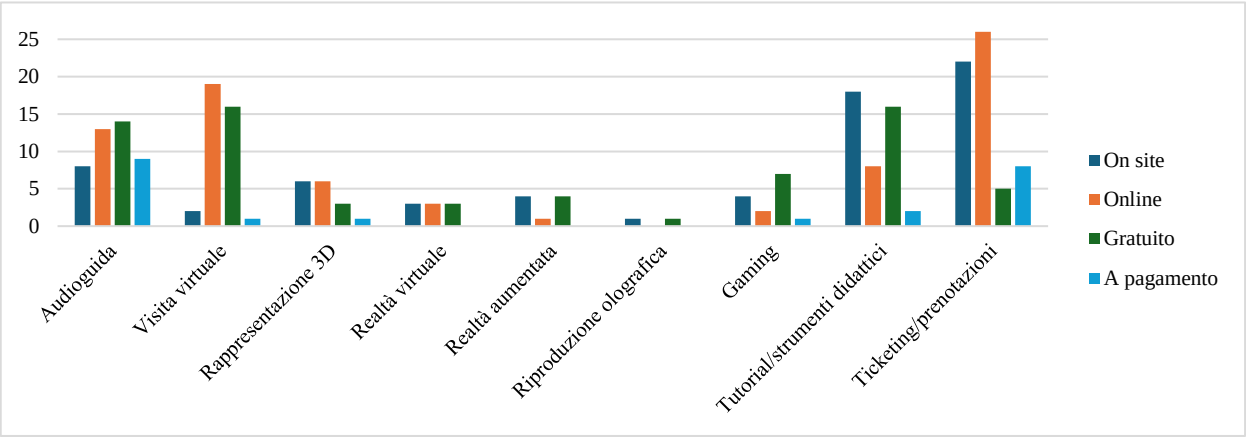
Le licenze più utilizzate per la condivisione e il riuso delle riproduzioni digitali delle opere d'arte sono Beni Culturali Standard (27%), Pubblico Dominio (23%) e Creative Commons (12%). Un aspetto significativo riguarda la misurazione dell'impatto della digitalizzazione sulle visite fisiche: sebbene non tutti gli istituti abbiano monitorato questa variabile, 12 hanno riportato un incremento dei visitatori, mentre nessuno ha riscontrato una diminuzione.

Grafico 10. Possibilità di accesso da remoto alle opere digitalizzate. Elaborazione propria.



Mezzi di accesso alle opere digitalizzate	*Numerosità assoluta*	*Numerosità relativa*
Piattaforme social	*14*	*20,0%*
App mobile	*3*	*4,3%*
Sito istituzionale	*37*	*52,9%*
Non ancora possibile accedere	*4*	*5,7%*
Altro sito web	*12*	*17,1%*

Grafico 11. Offerta di servizi digitali degli istituti. Elaborazione propria.



Servizio digitale	*On site*		*Online*		*Gratuito*		*A pagamento*	
Audioguida	*8*	*11,4%*	*13*	*18,6%*	*14*	*20,0%*	*9*	*12,9%*
Visita virtuale	*2*	*2,9%*	*19*	*27,1%*	*16*	*22,9%*	*1*	*1,4%*
Rappresentazione 3D	*6*	*8,6%*	*6*	*8,6%*	*3*	*4,3%*	*1*	*1,4%*
Realtà virtuale	*3*	*4,3%*	*3*	*4,3%*	*3*	*4,3%*	*0*	*0,0%*
Realtà aumentata	*4*	*5,7%*	*1*	*1,4%*	*4*	*5,7%*	*0*	*0,0%*
Riproduzione olografica	*1*	*1,4%*	*0*	*0,0%*	*1*	*1,4%*	*0*	*0,0%*
Gaming	*4*	*5,7%*	*2*	*2,9%*	*7*	*10,0%*	*1*	*1,4%*
Tutorial/strumenti didattici	*18*	*25,7%*	*8*	*11,4%*	*16*	*22,9%*	*2*	*2,9%*
Ticketing/prenotazioni	*22*	*31,4%*	*26*	*37,1%*	*5*	*7,1%*	*8*	*11,4%*

Gestione interna della digitalizzazione

Un dato critico è che il 97% degli istituti non dispone di un ufficio interno dedicato ai processi di digitalizzazione o trasformazione digitale, e solo il 10% possiede un piano strutturato di digitalizzazione che, quando disponibile, è conforme al Piano Nazionale. Questo evidenzia la necessità di strategie più solide e di una governance interna più strutturata per affrontare la transizione digitale in modo sistematico e duraturo.

I risultati evidenziano un quadro complesso e frammentato: se da un lato molte istituzioni hanno avviato processi di digitalizzazione e innovazione tecnologica, dall'altro emergono limiti significativi, legati alla mancanza di strategie consolidate, alla carenza di figure professionali dedicate e alla difficoltà di accesso a risorse finanziarie adeguate. La digitalizzazione rappresenta una sfida cruciale per il futuro della gestione museale, non solo per migliorare la conservazione e la documentazione delle collezioni, ma anche per rendere le opere d'arte più accessibili a un pubblico più ampio. L'assenza di una pianificazione strutturata e di investimenti adeguati ostacola il pieno sfruttamento delle potenzialità offerte dalle nuove tecnologie rendendo necessario un maggiore coordinamento a livello istituzionale, con una maggiore aderenza alle linee guida nazionali e lo sviluppo di politiche di supporto mirate a garantire una trasformazione digitale sostenibile ed efficace.

Oltre agli aspetti tecnici della digitalizzazione, da questi dati emerge che l'integrazione dei servizi digitali nei siti web e nelle piattaforme museali rimane limitata e disomogenea. Sebbene alcuni musei abbiano avviato iniziative per rendere accessibili online parte delle loro collezioni, la maggioranza lamenta un'inadeguatezza in termini di strumenti e risorse umane. In particolare, poche realtà offrono accesso online in alta risoluzione alle opere presenti nelle loro collezioni, e ancora meno hanno implementato tecnologie interattive come tour virtuali, esperienze in realtà aumentata o piattaforme immersive. La carenza di tali strumenti rappresenta un limite significativo alla capacità dei musei di ampliare il proprio pubblico, attirare nuove fasce di utenti e sviluppare strategie educative innovative basate sulle potenzialità offerte dalla digitalizzazione.

Inoltre, mentre alcuni musei, spesso di grandi dimensioni o con maggiori risorse economiche, hanno potuto sviluppare progetti ambiziosi in ambito digitale, altre istituzioni - in particolare quelle di piccole e medie dimensioni - faticano a tenere il passo con l'innovazione a causa di budget limitati, mancanza di personale qualificato e difficoltà nell'ottenere finanziamenti esterni. Questa disomogeneità rischia di amplificare il divario tra istituzioni con capacità tecnologiche avanzate e realtà meno attrezzate, limitando l'impatto complessivo delle strategie digitali nel settore museale.

Infine, un altro elemento critico emerso riguarda la scarsa valutazione dell'efficacia delle iniziative digitali già avviate. Poche istituzioni hanno implementato strumenti per monitorare l'impatto della digitalizzazione, sia in termini di incremento delle visite fisiche, sia in termini di engagement del pubblico online. Senza una misurazione sistematica dei risultati, diventa difficile per i musei comprendere se e in che modo le risorse investite nella digitalizzazione stiano effettivamente contribuendo a migliorare l'accessibilità, la valorizzazione e la fruizione delle collezioni. Anche in questo caso, per affrontare queste criticità, sarebbe opportuno sviluppare metodologie condivise per valutare il ritorno sugli investimenti digitali, promuovendo un approccio basato su dati concreti e misurabili.

Limiti della ricerca. *Un approccio strutturato alla digitalizzazione, che consideri non solo l'adozione di nuove tecnologie, ma anche l'implementazione di modelli organizzativi innovativi e sostenibili, potrebbe migliorare significativamente il coinvolgimento del pubblico con le collezioni di arte moderna e contemporanea. Questo aspetto è particolarmente rilevante in un contesto in cui la competizione tra le offerte culturali si estende sempre più al digitale e in cui i musei devono trovare nuove modalità per attrarre e fidelizzare visitatori, sia in presenza sia online. Strumenti come piattaforme digitali avanzate, esperienze interattive, realtà aumentata e strategie di engagement basate su dati analitici possono contribuire non solo ad aumentare la partecipazione culturale, ma anche a rafforzare la sostenibilità economica delle istituzioni, aprendo a nuovi modelli di fruizione e monetizzazione.*

A causa della dimensione e della rappresentatività del campione, che, pur includendo 70 istituzioni, potrebbe non riflettere completamente la diversità del panorama museale, è difficile inquadrare lo stato dell'arte dei processi digitali delle collezioni di arte in Italia per contribuire a sviluppare raccomandazioni concrete per i decisori politici, le istituzioni culturali e i professionisti del settore, benché questo sia il fine ultimo della ricerca. Un ulteriore limite è dato dall'attenzione prevalentemente rivolta agli aspetti istituzionali e strategici della digitalizzazione, senza un'analisi diretta dell'esperienza degli utenti finali. Infine, la ricerca si concentra sul contesto italiano, limitando la generalizzabilità dei risultati a livello internazionale, sebbene il quadro emerso possa offrire spunti utili per studi comparativi futuri.

Implicazioni manageriali. *I risultati evidenziano la necessità di politiche coordinate e investimenti mirati a supportare la digitalizzazione delle istituzioni di dimensioni più ridotte. Senza un intervento mirato, il rischio è che si accentui il divario tra i musei più grandi e meglio finanziati, capaci di adottare strategie digitali sofisticate, e quelli di piccole e medie dimensioni, che potrebbero rimanere esclusi da questa trasformazione.*

Superare le barriere economiche e strategiche è essenziale per favorire una transizione digitale più inclusiva, garantendo che il patrimonio culturale rimanga accessibile e fruibile nell'era digitale. In questo contesto, diventa fondamentale il potenziamento dei finanziamenti pubblici e privati, attraverso l'attivazione di fondi dedicati alla digitalizzazione, incentivi fiscali per gli investimenti nella tecnologia e il rafforzamento della collaborazione con il settore privato. Parallelamente, è necessario investire nella formazione di nuove figure professionali in grado di gestire la transizione digitale nei musei, come esperti in digital humanities, data analysts, sviluppatori di contenuti interattivi e specialisti in strategie di engagement online.

La collaborazione tra istituzioni culturali, decisori politici, università, centri di ricerca e partner tecnologici potrebbe contribuire a colmare le attuali lacune e rafforzare il ruolo dei servizi digitali nel settore museale. Creare reti di cooperazione tra musei, sia a livello nazionale sia internazionale, potrebbe facilitare lo scambio di competenze, la condivisione di buone pratiche e la realizzazione di progetti comuni di digitalizzazione. Inoltre, l'implementazione di standard condivisi per la catalogazione, la conservazione e la fruizione dei contenuti digitali consentirebbe una maggiore interoperabilità tra le piattaforme digitali museali, migliorando l'accessibilità e la visibilità delle collezioni.

L'adozione di tecnologie digitali avanzate, come Intelligenza Artificiale, Big Data Analytics e Realtà Virtuale/Aumentata, potrebbe inoltre ottimizzare l'erogazione dei servizi museali, consentendo esperienze più personalizzate e programmi educativi innovativi. Perché queste tecnologie possano realmente trasformare il settore, è necessario non solo adottarle, ma anche integrarle in strategie digitali sostenibili e di lungo periodo. Le istituzioni devono sviluppare piani di digitalizzazione che non si limitino all'acquisto di nuove tecnologie, ma che prevedano anche la formazione del personale, la manutenzione e l'aggiornamento costante delle infrastrutture digitali e una valutazione sistematica dell'impatto di tali strumenti sull'esperienza dei visitatori e sulla gestione del museo. In questo modo, la digitalizzazione non sarà un processo episodico o frammentato, ma una trasformazione strutturale capace di rafforzare la missione culturale e sociale dei musei nell'era digitale.

Originalità del paper. *Questo paper apporta un contributo originale al dibattito sulla digitalizzazione nel settore museale, concentrandosi specificamente sulle istituzioni che conservano collezioni di arte moderna e contemporanea, un ambito ancora poco esplorato rispetto ai musei archeologici o storici. Attraverso un'analisi empirica basata su dati primari, raccolti mediante questionari, lo studio fornisce una visione aggiornata delle strategie digitali adottate e delle barriere che ne ostacolano l'implementazione. Inoltre, il lavoro estende il framework teorico di Bertacchini et al. (2022), applicandolo a un contesto specifico e arricchendone le implicazioni. L'originalità del paper risiede anche nella sua prospettiva applicata: oltre a delineare le criticità del settore, propone raccomandazioni strategiche per favorire una digitalizzazione sostenibile e inclusiva, offrendo così un supporto concreto alle politiche culturali e alle istituzioni impegnate nella trasformazione digitale***.**

Parole chiave: *digitalizzazione, arte moderna e contemporanea, economia della cultura, musei, Italia.*

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https://luoghidelcontemporaneo.cultura.gov.it

Museums as knowledge-based organisations and Metaverse: preliminary evidence from a multiple case study

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Abstract

Museums serve as significant cultural and educational pillars within societies. They provide access to artefacts, stories, and knowledge that shape collective identity and foster learning, but they have rarely been analysed as knowledge-based organizations. In the actual era of digital transformation, museums are integrating different technologies such as artificial intelligence (AI), virtual reality (VR), augmented reality (AR), and, more recently, the Metaverse with impacts on how knowledge is managed. However, the potential of the Metaverse for museums as knowledge-based organizations remains underexplored, particularly in terms of inclusiveness.

This work-in-progress aims to address this gap by applying a knowledge-based view (KBV) to museums, exploring how they leverage the Metaverse to collect, curate, and disseminate knowledge through the employment of the SECI model by Nonaka and Takeuchi (1994). More specifically, this ongoing study seeks to answer the following research question: How can Metaverse technologies enhance museums' knowledge management (and inclusiveness)?

Adopting a multiple case study approach, this research investigates how museums integrate Metaverse solutions to enhance their knowledge processes. Preliminary results indicate two key themes. First, museums adopting Metaverse technologies are enhancing their knowledge acquisition and dissemination capabilities through strategic partnerships with technology firms. Second, the SECI model is a valid tool for effectively capturing the recent evolution of museums' value proposition, illustrating how virtual interactions can facilitate knowledge socialization, externalization, combination, and internalization. This research contributes to literature by positioning museums as knowledge-based organizations within the Metaverse landscape, bridging the gap between knowledge management and cultural heritage studies.

Framing of the research. *Museums are repositories of human history, culture, and knowledge, playing a crucial role in the preservation and transmission of these knowledge assets, and reinforcing their testimony as civic value to future generations. In recent years, the traditional museum model is undergoing a transformation with the advent of digital technologies (Simone et al., 2021; Russo Spena et al., 2022; Lu et al., 2023; Botti & Baldi, 2025), from virtual and augmented reality (tom Dieck et al., 2018; Errichiello et al., 2019; Trunfio et al., 2020; Khalil et al., 2024; Tang & Zhou, 2025) to the Metaverse (Longo & Faraci, 2023; Sepe et al., 2024). Digital transformation is reshaping the ways museums operate (Li et al., 2024), leading to increasing reliance on both database systems to store and retrieve vast amounts of information related to artifacts, collections, and archives, and online catalogues, making knowledge more accessible and shareable through digital catalogues. More recently, with artificial intelligence (AI) algorithms museums have aided in the classification and interpretation of objects, assisting curators in organizing and presenting collections more efficiently. Further, the museums can exploit their knowledge through Metaverse as a digital space that transforms virtual experiences into a more immersive, three-dimensional environment. Within this environment, users' activities (i.e., actual or potential on-site visitors) are enhanced through augmented reality (AR) and virtual reality (VR) technologies and their engagement is boosted at an increasingly sophisticated level (Longo & Faraci, 2023; Sepe et al., 2024).*

The Metaverse is a rapidly expanding global market, estimated to be worth approximately $130.5 billion in 2024, with projections exceeding $1 trillion by 2030 (Statista, 2024). Its adoption has been increasingly examined from both theoretical and practical perspectives, providing insights into its impact across multiple industries (Dwivedi et al., 2023). In particular, tourism studies have extensively explored its potential to reshape visitor experiences (Gursoy et al., 2022; Buhalis et al., 2023; Liu & Park, 2024; Zhang et al., 2024). From a more applied standpoint, researchers have developed conceptual frameworks to structure its evolution, such as the seven building blocks proposed by Keegan et al. (2024), which encompass identity, conversations, sharing, presence, relationships, reputation, and groups.

In the context of museums, this ongoing discourse on the Metaverse underscores the necessity of designing next-generation cultural organizations where immersive digital environments allow visitors not only to engage with the past

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through storytelling and interactive experiences but also to envision the future (Longo & Faraci, 2023). This transformation is particularly relevant for aligning museums' offerings with the expectations of younger, digitally native audiences, ensuring that cultural heritage remains accessible, dynamic, and engaging in an increasingly virtual world.

The Metaverse represents a novel paradigm that has the potential to reshape museums' knowledge processes by enabling immersive, participatory, and socially sustainable experiences. The interactive and multimodal nature of the Metaverse aligns well with knowledge co-creation, as it fosters new forms of engagement through AR and VR (Dwivedi et al., 2023). These technologies not only democratize access to cultural heritage but also enhance inclusiveness by removing physical barriers and providing adaptive environments for diverse audiences, including individuals with disabilities (Arpaci et al., 2022).

Purpose of the paper. *Despite the profound impact of digital transformation on museums and the rapid advancements in immersive technologies such as the Metaverse, existing research has yet to systematically apply a knowledge-based view (KBV) to analyse this evolving landscape. KBV, predominantly used in business studies, posits that an organization's ability to create, capture, and manage knowledge resources is a fundamental source of competitive advantage (Grant, 1996). Extending this perspective to museums provides a valuable framework for understanding their function as knowledge-based organizations dedicated to the collection, curation, dissemination, and interpretation of cultural, historical, and scientific knowledge.*

Previous studies on KM in cultural and creative industries (CCIs) have primarily focused on cultural organizations' roles as collaborators for other firms rather than analysing them as independent knowledge-based organizations (KBOs) (Santoro et al., 2020). This lack of research has led to an underrepresentation of museums' contribution to KM calling for further research on the application of KM in CCIs through a declination of "a knowledge-based perspective related to the adoption of digital technologies in creative and cultural organisations" (Lerro et al., 2022, p. 1935), even though they are deeply involved in knowledge creation, dissemination, and preservation, especially through the opportunities offered by technologies as the Metaverse. On the other side, the integration of technologies by museums (Russo Spena et al., 2022; Longo & Faraci, 2023; Botti & Baldi, 2025) and their impacts has been analysed especially focusing on museums' digitization strategies (Agostino et al., 2020; Simone et al., 2021; Li et al., 2024) while their role in KM remains underexplored, particularly about the opportunity offered by the Metaverse.

This extended abstract aligns with the call for further research trying to fill such a critical gap, given that museums operate as complex knowledge-based organizations, engaging with diverse stakeholders - including visitors, scholars, educators, and policymakers - through both physical and digital interfaces. And these issues are even more evident in the context of technological advancements such as AI, VR, and the Metaverse that have the potential to improve access to knowledge and foster inclusiveness. So, to overcome this gap, we have looked at one of the most influential models in KM (Lambe, 2011; Gaviria-Marin et al., 2019), the SECI model by Nonaka and Takeuchi (1994), that conceptualizes knowledge as an evolving process consisting of socialization, externalization, combination, and internalization to examine museums as knowledge-based organizations. We aim to explore how the Metaverse contributes to the way museums collect, curate, and disseminate knowledge through the adoption of the SECI model. Specifically, this ongoing research seeks to answer the following research question: How can Metaverse technologies enhance museums' knowledge management towards inclusiveness?

Methodology. *This extended abstract employs a qualitative multiple case study methodology, which is particularly suitable for exploring contemporary phenomena in real-world contexts (Yin, 2018). The case study approach allows for an in-depth investigation of how museums are adopting Metaverse technologies to enhance KM and inclusiveness, aligned with the SECI model (Nonaka & Takeuchi, 1995).*

The selected cases include five museums that have pioneered collaborations with technological firms to integrate Metaverse solutions. The selection criteria were based on: a) active use of Metaverse; b) diversity in geographical and institutional context to capture different adoption approaches; 3) availability of data from museum websites, academic literature, and industry reports; 4) potential to contribute to inclusiveness and social sustainability in cultural heritage management.

A summary of the selected museums and their Metaverse initiatives is provided in the following table (Table 1).

Year (↓)	Museum name / Metaverse name	Metaverse platform	Tech company	Country
2021	PODO Museum	Zepeto	Naver Z	South Korea
2022	MAXXI / MAXXIVERSO	Arium.xyz	Arium Virtual Technologies	Italy
2023	The Metropolitan Museum of Art	Roblox	Roblox Corp.	USA
2024	Museo del Cinema	Thenemesis.io	The Nemesis	Italy
2024	Palazzo delle Arti Napoli / MetaPan	Spatial.io	Spatial Systems	Italy

The qualitative research design, after case selection, consists in data collection and analysis. Data collection was primarily conducted through secondary documents as museum reports, press releases, and industry reports, but also through website and digital content as museums' official website and virtual exhibitions. Further, we plan to carry out expert interviews with key stakeholders (i.e., museums' curators, technological partners, accessibility experts).

The collected data will be analysed through thematic coding, focusing on the partnership dynamics between museums and technology firms, and on how knowledge is created and shared through the Metaverse. Findings will be mapped onto the SECI model to understand how tacit and explicit knowledge are transformed within digital museum spaces.

Results. *The initial evidence allows us to delineate two main themes: 1) a narrative analysis of case studies' adoption of Metaverse using a temporal perspective and highlighting the knowledge acquisition through the partnerships with technological firms; 2) a preliminary adoption of the SECI model.*

The first collected data allow us to reconstruct the collaboration process and the main objectives of museums' adoption of Metaverse. Starting from the oldest case study, PODO Museum in Jeju, South Korea, it partnered with Zepeto, a virtual platform where users can create avatars and interact with art in 3D virtual spaces. This partnership aims to provide a digital experience of art exhibitions, enhancing accessibility for a global audience and particularly younger, digitally savvy visitors. The following year, MAXXI, the National Museum of the 21st Century Arts in Rome, has teamed up with Arium to enhance its virtual presence. Arium's platform enables the museum to showcase its collection in a fully immersive virtual environment, reaching audiences who may not be able to visit in person, particularly due to geographic or physical barriers. This collaboration underscores the potential of virtual technologies in promoting inclusiveness and accessibility in the arts. In 2023, also the Metropolitan Museum of Art (Met) in New York partnered with Verizon and Roblox to create an immersive AR experience called Replica. Visitors can use the app to scan artwork from the museum's collection and then access these pieces virtually within Roblox. Users can collect and display digital replicas of famous works, such as Van Gogh's Self-Portrait and ancient Egyptian sculptures. This collaboration not only brings art into the digital realm but also engages younger audiences through gaming, blending education with entertainment. In the last analysed year, 2024, two Italian museums started a collaboration on the Metaverse: the Museo del Cinema in Turin established a partnership with The Nemesis, a virtual world platform, to create a digital space that mimics the physical museum and offer users a chance to interact with cinema history in a virtual format, expanding the museum's reach beyond physical visitors and allowing gamified interactions and new ways to engage with cinematic content and history; the Palazzo delle Arti di Napoli (PAN) started to work with Spatial.io to create immersive virtual galleries as the platform allows users to explore art exhibitions in 3D spaces, allowing for a more interactive and engaging experience.

The second theme reached as a preliminary result is the adoption of the SECI model in analysing museums using the Metaverse technologies. Socialization occurs through virtual interactions, where users can share experiences and knowledge about exhibits.

Externalization involves the transformation of tacit knowledge (personal, experiential knowledge) into explicit forms, allowing curators and museum professionals to articulate their expertise through structured digital initiatives. This process includes the design and documentation of virtual tours, where curators formalize their narratives, historical interpretations, and storytelling techniques. Additionally, the development of gamified experiences transforms curatorial knowledge into interactive, rule-based learning modules that enhance visitor engagement.

Combination is represented by the integration and restructuring of explicit knowledge, merging diverse data sources to create enriched digital experiences, such as combining historical artifacts with interactive digital elements. Internalization allows users to absorb and internalize the knowledge they encounter within the virtual environments, making it more accessible for long-term learning.

The preliminary evidence shows that digital transformation efforts allowed by the Metaverse can facilitate each of the SECI stages, enhancing both the depth and breadth of knowledge shared among audiences, but also between visitors and museums, and museums with high-tech companies managing the Metaverse platforms.

Research limitations. *While this extended abstract aims to provide valuable insights, several limitations must be acknowledged. First, the limited case selection as we focus on five museums, which may not fully represent the broader landscape of digital transformation in cultural organizations. Moreover, the findings may be influenced by the level of digital infrastructure in different regions, affecting the scalability of Metaverse adoption. Finally, as Metaverse technologies are still evolving, further research is needed to assess long-term impacts on knowledge management and social sustainability through longitudinal research.*

Managerial implications. *The preliminary results show potential implications for museums, technology firms, and policymakers. First, museums could benefit from KM strategies and tools to improve their main objectives - e.g., understanding the collection, curation and dissemination of knowledge -, and enhance their efforts in using Metaverse, aligning this innovation with existing knowledge creation and dissemination practices. They can benefit from a partnership with technology firms to accelerate the integration of emerging technologies to improve accessibility and inclusiveness. These potentialities, however, need to be sustained by investment in digital literacy training for staff as it is crucial to manage and curate immersive experiences effectively.*

Looking at technology firms, developing collaboration with museums offers opportunities to co-develop digital solutions tailored to the cultural heritage sector, which is particularly sensitive to accessibility needs (e.g., voice navigation, haptic feedback for visually impaired users, customizable avatars). These developments would also be essential for other sectors with which tech firms collaborate.

Finally, it seems evident how policies should encourage funding and support for digital transformation in museums, ensuring equitable access to Metaverse resources without forgetting to provide regulations on data privacy and digital ownership in virtual museum spaces to protect both institutions and users.

Originality of the paper. *This extended abstract aims to contribute to the literature on knowledge-based organizations by applying this research perspective to an overwhelmed sector as CCIs (Lerro et al., 2022). Focusing on museums, we have tried to start bridging the gap between KM literature and cultural heritage studies, with a particular attention to the application of the SECI model to analyse KM in museums within the Metaverse. We expand the KBV of*

cultural organizations, emphasizing their role in accessibility and inclusiveness thanks to the exploitation of knowledge through Metaverse. By positioning museums as knowledge-based organizations, this research highlights how Metaverse innovations can foster inclusiveness, engagement, and sustainable knowledge sharing in the cultural sector. As digital transformation accelerates, museums must proactively leverage these technologies to remain relevant in an increasingly interconnected world.

The preliminary results show that museums implementing Metaverse technologies in collaboration with technology firms managing platforms like Roblox, Spatial.io, and Zepeto, can enhance the way of collecting, curating, and disseminating knowledge through the adoption of the SECI model.

Through these projects, museums can break down geographical and physical barriers while providing educational experiences that are both inclusive and interactive, especially for younger generations.

Museums play a critical role in engaging various stakeholders, including local communities, scholars, educators, and tourists. The use of the Metaverse can enhance these engagements by creating collaborative spaces where stakeholders can contribute to the development of exhibits, share knowledge, or provide feedback. By using the Metaverse, museums can engage with global audiences, providing virtual tours and interactive experiences that attract people who may otherwise be unable to visit in person due to geographic, financial, or social barriers.

One of the most transformative impacts of the Metaverse on museums is its ability to enhance inclusiveness, particularly for people with disabilities. Traditional museums can present challenges for visitors with mobility impairments, sensory disabilities, or learning difficulties. In contrast, virtual environments such as the Metaverse can be designed to accommodate a wide range of needs, eliminating physical constraints and providing unrestricted access to collections. By breaking down geographical and financial barriers, the Metaverse extends museum experiences to audiences who may otherwise be unable to visit in person. It also offers adaptive tools such as audio descriptions, haptic feedback, and customizable avatars, making art and education more accessible. Additionally, Metaverse technologies can provide real-time translation services for individuals with hearing impairments and create multi-sensory experiences tailored to visitors with autism. These innovations reinforce museums' commitment to social sustainability by fostering greater inclusiveness and ensuring equitable access to cultural heritage.

Key words: *Museums; Knowledge-based organization; SECI Model; Metaverse; Inclusiveness; Social Sustainability*

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Does virtual help real? Investigating how virtual tours affect learning, satisfaction, museum liking, and willingness to visit

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Abstract

Assuming the disruptive role played by Information and Communication Technologies (ICTs) in enhancing museums' appeal and attracting new audiences, this paper focuses on how virtual tours (VTs) can be used as an information tool outside of a museum and their effects on users' learning and satisfaction as well as the museum liking and the intention to visit it. Two experiments were designed. The first experiment was conducted to compare the impact of a text-based tool (a written guide) with the impact of an immersive tool (a virtual tour) on these variables, and to investigate the mediating role of the flow experience. A second study was designed to explore the moderation role of museum reputation, comparing a well-known museum with a less known one. As for the first experiment, both multivariate and post-hoc univariate models show that the VT increases visitors' satisfaction, but does not significantly increase learning levels, museum liking, and willingness to visit. The relationship between VT use and satisfaction is mediated by the flow experience. The differential multivariate effects of VTs strengthen the internal validity of the emerging relationship with satisfaction and the missing relationships with more distal psychological variables. Taken together, the results orient practitioners towards reconsidering the use of traditional written tools and evaluating the quality of VR-based experiences.

Framing of the research. *With recent advancements in Information and Communication Technologies (ICTs) an increasing number of museums has recently resorted to new technologies (Nigro et al., 2018) not only to preserve cultural heritage, but also to make the institution more accessible and appealing to the wider public, thus transforming museums into places where visitors are invited to live memorable experiences (Leoni & Cristofaro, 2021). Virtual reality (VR) is an emerging technology based on interactive simulations recreating physical experiences in a virtual environment (Manis & Choi, 2019), and it is widely used to create virtual museum exhibitions. For instance, virtual tours (VTs) can enhance both the on-site and off-site visitor experience, by creating immersive paths and interactive content that can encourage visits (Jung et al., 2016; Kabassi et al., 2019).*

Several studies have explored some aspects of user experience museums, analysing, for example, the effectiveness of VR technologies in terms of immersion and overall satisfaction (Anastasovitis & Roumeliotis, 2023; Škola et al., 2020; Arayaphan et al., 2022) and learning outcomes (Pei et al., 2023). However, how the use of these technologies outside of a museum impacts users' learning, satisfaction, and intention remains understudied.

It is also unclear how a museum's reputation affects the relationship between VR and visitors' intention and experience. Indeed, even if some studies show that brand awareness – at the aggregate level – is occasionally able to predict the firm's market performance (Homburg et al., 2010), there is a paucity of research on the impact of brand awareness and individuals' purchase intention.

The aim of this ongoing study is to fill these gaps and investigate the impact of museum information tools and museum reputation on users' learning and satisfaction and on museum liking and willingness to visit. To this aim, the impact of VR-based tools on these variables has been compared with that of traditional written guides. A first experiment focusing on a lesser-known museum has been conducted, and a second one comparing two museums that differ in reputation has been designed.

Purpose of the paper. *Satisfaction in museums is influenced not only by the technical quality of the service but also by the emotional, cognitive, and social values associated with it (Caldwell, 2002; Martín-Ruiz et al., 2010). While analysing the image formation process of a museum, Gil and Ritchie (2009) found that the affective and emotional dimensions of the service experience, such as socialising and enjoying, have a greater influence on visitors' perceptions of the museum than cognitive factors. Similarly, Conti et al. (2017) revealed that museum visitors seek new forms of value co-creation, focusing on other dimensions of the cultural experience, such as entertainment, escapism, and socialisation.*

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The use of new technologies positively affects cultural consumption, both in qualitative (quality of the diffusion of the knowledge) and quantitative (number of people who can access knowledge) terms (Bekele et al., 2018). For instance, in museums, VR enables a user-centred presentation and provides visitors with authentic, engaging and tailored experiences within the cultural heritage context (Han et al., 2019; Southall et al., 2019). This is particularly true in the case of VTs, immersive visit support tools that place users inside a place or image, improving their "situational awareness and providing the highest level of functionality for viewing, capturing and analysing virtual data" (Osman et al., 2009, p. 173).

Therefore, visitors should be able to better appreciate museums since the interaction between them and cultural artefacts is facilitated (Hawkey, 2004). Integrating traditional cultural content and other experiences, such as socialisation, immersion and entertainment, VR tools can enhance visitors' satisfaction and enjoyment and amplify the experiential value of cultural heritage (Trunfio et al., 2018, 2022).

VR is also recognised as a valuable tool for educational purposes (Arayaphan et al., 2022). It could enhance the whole learning process (Fowler, 2015; Tom Dieck et al., 2018): users can get information about the cultural institution, collections or single objects in a playful and engaging way, with significant benefits also in terms of satisfaction. Existing studies on learning in VR-based museums generally concern knowledge acquisition and cognitive skills but also emotional engagement (Zhou et al., 2022). Some research highlighted the potential of AR and VR tools to enhance higher-order thinking skills, such as creative thinking (Guazzaroni, 2013; Hammady et al., 2020) and critical thinking (Poce et al., 2019).

Furthermore, hard-to-access sites can be made available through VR (Jung et al., 2016). By creating digital learning resources, museum VTs develop an "offsite" offer that stimulates user engagement, thus meeting the needs of those who are not able to physically visit a museum or those who want to have an idea of the museum before visiting it (Kabassi et al., 2019). This represented a crucial opportunity during the Covid-19 pandemic, when the general closure of museums led cultural institutions to develop and adopt a wide variety of approaches, such as VTs, able to stimulate remote engagement (Noble, 2021; Sifaki, 2022). More generally, in a marketing perspective, VTs can act as promotional tools to catch potential visitors' attention and invite them to physically visit a museum (Wang et al., 2024). Based on these premises, VR is also increasingly applied in cultural tourism as a bridge between potential tourists and destinations (Lee et al., 2020).

Thus, we state that:

H1a. The information tool influences visitors' satisfaction.
H1b. The information tool influences museum liking.
H1c. The information tool influences visitors' learning.
H1d. The information tool influences the willingness to visit a museum.

Two crucial elements in VR-based experiences are represented by the "sense of being there" and the flow experience. VR can generate a strong sense of presence in users, offering them the opportunity to experience a high degree of immersion and to interact with virtual spaces in realistic ways (Guttentag, 2010). This immersion can, in some cases, lead to a flow state (Tussyadiah et al., 2018), a mental condition in which individuals become fully engaged in an activity and experience a profound sense of enjoyment and satisfaction (Csikszentmihalyi, 1990; Wang et al., 2024)..

Virtual environments also generate stronger emotional responses that, in some cases, can lead to greater appreciation and liking for the experience (Kim & Hall, 2019).

Furthermore, immersive technologies provide users with engaging experiences and create interactive learning environments that support deeper cognitive and knowledge retention processes (Dede, 2009). Additionally, in this immersive environment, users can experience a museum or a single artefact in a way similar to the real exploration, thus enhancing learning outcomes (Radianti et al., 2020).

In addition to educational benefits, immersive virtual experiences stimulate curiosity and interest by offering a preview of a museum's offerings, thus encouraging users to plan an in-person visit (Tussyadiah et al., 2018). Supporting this, Lee et al. (2020) highlighted that users' willingness to visit museums is influenced by VR's ability to deliver absorbing experiences characterised by high levels of engagement and immersion. Thus, we state that:

H2a: Flow mediates the relationship between the information tool and visitors' satisfaction.
H2b: Flow mediates the relationship between the information tool and museum liking.
H2c: Flow mediates the relationship between the information tool and visitors' learning.
H2d: Flow mediates the relationship between the information tool and the willingness to visit a museum.

Museum reputation, including factors such as brand awareness, can influence both visitor preferences and satisfaction. Indeed, prospect customers are commonly believed to be more attracted to popular locations and museums (Bollo 2004; Solima 2013) and the museum's brand image can positively impact visitor satisfaction, which, in turn, increases their likelihood of recommending the museum to others (Virto et al. 2024). The interaction between awareness and informational tools on visitors' satisfaction is less predictable. On the one hand, it might be that greater museum brand awareness enlarges pre-consumption expectations, making it more difficult for the brand to meet them. Following this line of reasoning, brand awareness might negatively affect visitors' satisfaction, irrespective of the digital tool adopted before the visit. On the other hand, however, well-known museum brands may be buffered against negative

visitors' evaluations, especially because of the higher perceived reliability of renowned institutions (Daskalaki et al., 2020). This might be reflected in greater post-consumption satisfaction.

Additionally, more popular museums might induce greater learning in visitors who encounter them, whether through a written guide or a virtual tour. This effect of museum brand awareness on visitors' learning might be due to the fact that visitors are more motivated to learn about well-known museums rather than about unknown museums (Yang & Lau, 2019).

Museum brand awareness might play an important role in spurring visit intention, especially for first-time visitors (Gartner & Ruzzier, 2011). Indeed, awareness is deemed as a necessary condition for a trial purchase to occur. If people are not aware of the existence of a museum, they do not have the opportunity to develop an intention to visit it. However, awareness is not a sufficient condition for products' first trials, since awareness might fail to induce interest in the product, and so it might not lead to increased behavioural intention. For instance, according to the hierarchy of effects model, consumers' behaviour evolves out of a series of stages that lead one into the other: firstly, consumers have to become aware of the brand, then they acquire knowledge about it, then they eventually start liking the brand, and only at the end of this chain of effects can consumers develop the intention to consume the brand (Hutter et al., 2013). Thus, we state that:

H3a. Museum reputation moderates the relationship between the information tool and visitors' satisfaction.
H3b. Museum reputation moderates the relationship between the information tool and museum liking.
H3c. Museum reputation moderates the relationship between the information tool and visitors' learning.
H3d. Museum reputation moderates the relationship between the information tool and the willingness to visit a museum.

Methodology. *Study 1 was designed to inspect the main effects of information tools (H1a-d) and the mediational role of flow (H2a-d). The online survey experiment was delivered to university students attending different bachelor's and master's degree courses at an Italian University, located in the Marche Region, so focusing on the preferences of younger generations (especially Gen Z). In this between-subjects study, we manipulated the information tool (virtual tour vs written guide), and participants were randomly assigned to either of two experimental conditions.*

The scenario of the manipulation of information tools was constituted by the Civic Museum of Annunziata Church, a painted medieval church located in the small village of Cossignano, in the Marche Region, expected to be very little known even by people living in surrounding areas. Participants were first asked whether they had ever heard of the museum (i.e., museum awareness) and whether they had ever visited it (i.e., past visit experience). We also measured pre-intention to visit by asking participants their willingness to visit the museum within the next 12 months on a 7-point Likert scale (i.e., pre-intention to visit). Then, depending on the information tool condition they were asked to use, we invited participants either to read a written guide or to undertake a virtual tour of the museum.

The survey included four dependent variables (DVs). Learning level was measured through two multiple-choice questions and one true/false question about the VT experience. The learning score was obtained by summing the number of correct answers to the three questions. Subsequently, we measured how much participants liked the museum on a 0 to 10 scale, while users' satisfaction was measured on a 7-point Likert scale (i.e., "How much are you satisfied?"). Flow experience was measured by asking participants to indicate their agreement on a 7-point Likert scale to 7 items, derived from the flow scale (Wang et al., 2024). The scale was synthesised in a single score using Principal Component Analysis. Finally, participants indicated their propensity to visit the museum on a 7-point Likert scale.

In Study 2, the sample was expanded both in size and geographical scope, and museums differing in both popularity and type were considered. The same structure as Study 1 was maintained (same dependent variables and mediator), while introducing the manipulation of museum reputation in order to test the moderation hypotheses (H3a-d), since we expect that, in well-known museums, virtual tours might have a more positive effect on learning and satisfaction than they have in the context of unknown museums. We also want to explore whether, in museums with established names, virtual tours have no effect on intention (as in unknown museums), a positive effect, or a negative effect (testifying a substitution effect). Therefore, this full-factorial experiment involves two between-subjects factors: information tool (written guide vs virtual tour) and brand reputation (Uffizi Galleries - i.e., well-known museum - vs Civic Museum of Todi - less well-known museum).

Results. *Study 1 was carried out between November and December 2024. Our final sample included 190 people (M_{age} = 22.2, SD_{age} = 3.35, age range from 19 to 52 years old; 46 males, 112 females, 1 non-binary, 4 preferred not to disclose; 122 from the Marche Region).*

Table 1. Correlation matrix among the dependent variables

	Satisfaction	Liking	Learning	Intention
Satisfaction	1.00			
Liking	0.48 ***	1.00		
Learning	0.10	0.08	1.00	
Intention	0.39 ***	0.54 ***	0.17 **	1.00

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 ' ' 1*

This study focuses on multiple DVs, i.e., satisfaction, liking, learning, and intention. Except for learning and satisfaction, and learning and liking, the DVs are moderately correlated with each other (Tab. 1).

The joint main effects of the information tool on the multiple DVs were assessed through multivariate analysis of variance (MANOVA), revealing a significant multivariate effect (Wilks' λ = .909, F = 3.970, p = .004). Follow-up ANOVAs show that the main effect of the information tool is significant only for user satisfaction (t = 3.812, p < .001).

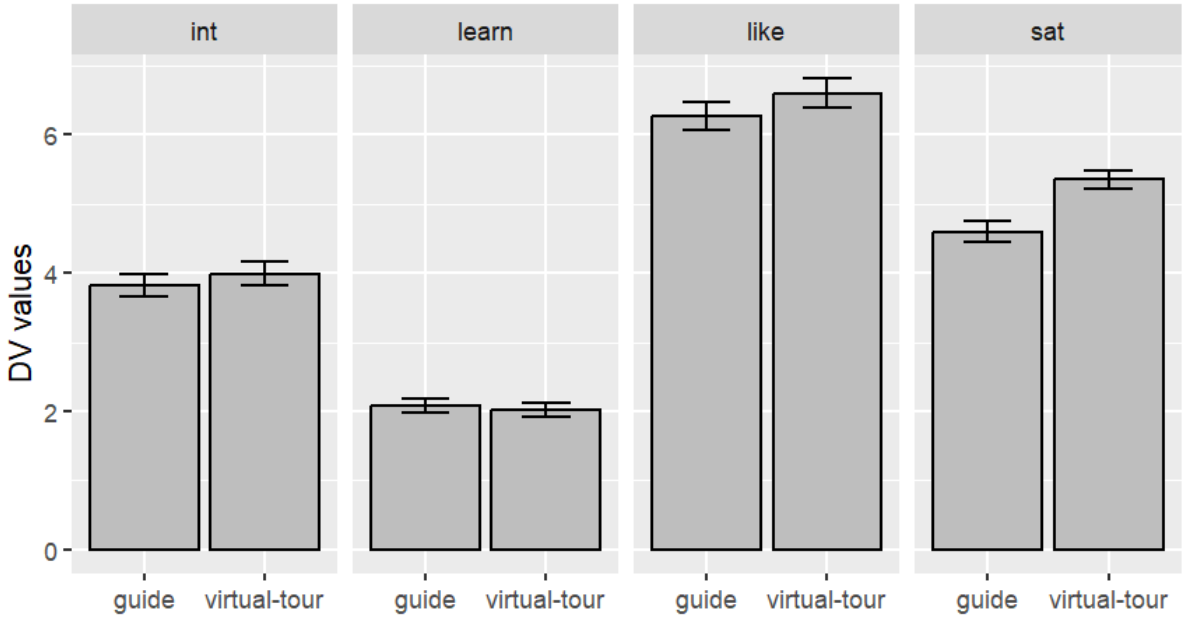
Table 2. Multivariate and post-hoc univariate analysis of variance tables of the relationship between visit support tools, and the DVs

		MAIN EFFECT (MODEL 1)		**MAIN & CONTROLLED EFFECT (MODEL 2)**		**MAIN & MEDIATOR EFFECTS (MODEL 3)**	
DV	**IV**	**Wilks λ**	**F-value**	**Wilks λ**	**F-value**	**Wilks λ**	**F-value**
Learning, Satisfaction, Liking, Intention	Support tool	.909	3.970 **	.907	4.002 **	.833	7.987 ***
	VR familiarity			.944	2.313		
	Awareness			.984	.622		
	Past Exp			.946	2.444		
	Pre-intention			.368	66.902 ***		
	Flow					.329	65.204 ***
Learning	Support tool		0.290		.308		.289
	VR familiarity				9.334 **		
	Awareness				1.207		
	Past Exp				1.440		
	Pre-Intention				1.884		
	Flow						.341
Satisfaction	Support tool		14.645 ***		15.562 ***		28.156 ***
	VR familiarity				.187		
	Awareness				.312		
	Past Exp				.262		
	Pre-Intention				13.444 ***		
	Flow						151.382 ***
Liking	Support tool		1.5264		2.244		2.351
	VR familiarity				0.088		
	Awareness				1.386		
	Past Exp				6.604 *		
	Pre-intention				72.579 ***		
	Flow						89.022 ***
Intention	Support tool		.497		1.200		.671
	VR familiarity				.517		
	Awareness				.324		
	Past Exp				.981		
	Pre-intention				232.254 ***		
	Flow						57.841 ***

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 ' ' 1*

We repeated the same analyses including VR familiarity, museum awareness, past visit experience, and pre-intention as covariates (Tab. 2). The multivariate effects were statistically significant both for the manipulated factor (Wilks' λ = .907, F = 4.002, p = .004) and for the pre-intention control variable (Wilks' λ = .368, F = 66.902, p < .001). Post-hoc ANCOVAs including all the control variables show that the information tool still had a significant effect on user satisfaction (F = 15.724, p < .001) exclusively. Considering these analyses overall, it seems that the VT determines significantly greater satisfaction in users than the written guide does, while a limited impact of the VT on learning and visit intention appears to emerge (Figure 1).

Figure 1. Bar plots comparing experimental conditions' means on intention to visit, learning, museum liking, and user satisfaction. Error bars are also included.



Finally, to test the mediation hypotheses, we first inspected the effect of the information tool on the alleged mediator, i.e., flow. The analysis of variance shows that participants in the virtual tour condition experience significantly more flow (M = 0.621, SE = .219) than those in the written guide condition do (M = -0.509, SE = .214, t = 3.688, p < .001). Having assessed the first portion of the indirect effect, we then employed a MANCOVA model, including the information tool as the independent variables, the flow variable as a covariate, and learning, user satisfaction, museum liking, and visit intention as DVs. It turned out that both the information tool (Wilks' λ = .833, F = 7.987, p < .001) and flow (Wilks' λ = .329, F = 65.204, p < .001) significantly influence the DVs. More specifically, the effect of the information tool on the DVs decreases when flow is included as a covariate within the model, as indicated by the Wilks' λ of the visit support tool being lower in this MANCOVA model than in the original MANOVA (i.e., model 1 and model 3 in Tab. 2). This indicates that flow may function as a mediator of the relationship between information tools and at least one of the DVs.

By employing the percentile method to compute nonparametric bootstrapped confidence intervals, we verified that, out of the DVs, user satisfaction was indirectly influenced by the information tool because of the mediational role played by the flow experience. More specifically, flow fully mediated the relationship between information tools and user satisfaction, since the average direct effect (ADE) was not statistically significant, while the average casual mediation effect (ACME) was estimated to be .511 (p < .001).

Research limitations. *The research is still in progress, and the second study is ongoing (data have been collected and are now being analysed). We are still analysing the moderation role of museum reputation. Future research could explore the application and impact of similar tools in other museum contexts and examine how different VR design elements, such as interactivity and storytelling, influence the user visitor experience, particularly learning outcomes and the propensity to visit. A long-term, qualitative study on the effects of VR experiences on overall engagement and knowledge retention would also provide valuable insights, helping to evaluate the relationship between initial satisfaction and enduring impact.*

Managerial implications. *This study highlights the potential of VR tools, particularly VTs, compared to traditional informational tools, in enhancing the museum experience by fostering visitor satisfaction and engagement through increased flow. However, the limited impact of the VT on other aspects, such as learning, museum linking and intention to visit, raises questions about the role of VR tools as "pre-visit" tools or incentives for physical visits. While VR tools like VTs can serve as bridges between cultural institutions and remote or hesitant audiences, they are not able to really improve accessibility and increase the likelihood of future physical visits by offering engaging previews. This limitation underscores the risk of immersive experiences becoming "substitutes" for actual visits rather than an incentive to visit.*

In this scenario, the role of the place where the destination is located should also be considered - if it is known or not by potential visitors.

Therefore, cultural institutions should re-consider their communication strategies and specifically the role played by VR tools, balancing technological innovations with learning and emotional needs and reconsidering the use of traditional information tools in addition to the quality of VR-based experiences. From a managerial perspective, in contexts where audience engagement and attention levels may be limited, caution is needed in applying VTs, as they may overwhelm or disengage users rather than enhance the experience.

Originality of the paper. *Differently from prior studies, this paper aims at analysing the use of VR technologies outside of a museum and its multiple customer-centric outcomes, such as learning, satisfaction, liking, and visit intention. Specifically, our interest is in assessing the differential effect of VTs as compared with traditional written guides. This study advances the literature on this topic by showing that the positive effects of virtual tour guides are limited, especially when compared with traditional written guides, questioning the need to put efforts and resources into developing such tools within the museal context.*

Key words: *virtual reality; museum information tools; satisfaction; museum liking; learning; willingness to visit.*

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Twin transition and museum ecosystem: a governance model to enable the digital and sustainable transformation

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Abstract[6]

The twin transition has emerged as a key paradigm within European Union policies to address contemporary economic, environmental, and technological challenges. Digital innovation ecosystems play a crucial role in driving this transition due to their capability to foster collaboration, accelerate technological development, and embed sustainable practices. While prior studies have explored the twin transition in manufacturing sector and SMEs, its application within the museum industry remains underexplored.

Museums as hubs of cultural preservation and education present an ideal context for exploring the twin transition. By integrating immersive technologies (e.g. augmented reality -AR- and virtual reality -VR-), museums can simultaneously enhance visitor engagement and operational efficiency even reducing their environmental footprint. As part of the digital innovation ecosystems, it is interesting to investigate the governance, scalability, and the alignment of diverse stakeholders in the museum industry. In turn, the research aims to offer a comprehensive understanding of how the governance model and the collaborative dynamics among actors in digital innovation ecosystems can facilitate the twin transition. It investigates the characteristics of a governance model that facilitate the twin transition of digital innovation ecosystems in the museum sector, focusing on their role in aligning diverse stakeholders' purposes, needs and practices so as to achieve digital and sustainability transformation objectives. An instrumental case study method on the 5G4C.A.P.10100 project, a government-funded initiative led by the University of Turin in collaboration with research institutions, technology providers, museums, and public authorities is applied. The project leverages emerging technologies-such as AR, mixed reality (MR), and non-fungible tokens (NFTs)-to enhance visitor engagement and operational efficiency while supporting sustainability goals.

Empirical data collection is in progress through 20 in-depth interviews with key stakeholders, including representatives from research institutions, technology companies, museums, and local authorities. The semi-structured interview format allows for flexibility in exploring governance mechanisms while ensuring consistency with research objectives. The study employed projective techniques to examine strategic goal setting, coordination processes, and stakeholder interdependencies. A pilot phase was conducted to refine the interview protocol and increase the reliability of the research.

The study will contribute to providing theoretical, managerial, and social implications. Theoretically, it runs insights into governance frameworks that enable the twin transition in digital innovation ecosystems, emphasizing collaboration, knowledge sharing, and value co-creation. From a managerial perspective, the research offers practical guidance for project leaders and ecosystem managers in implementing governance models that foster innovation, sustainability, and scalable solutions. Socially, the study highlights how digital innovation ecosystems can enhance accessibility to cultural heritage, promote inclusivity, and support sustainable museum practices.

While the research is based on a single case study, it lays the foundation for further exploration of governance models in digital innovation ecosystems across different sectors. Future studies could employ comparative analyses to validate

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and refine the proposed framework. The originality of this research lies in its focus on the twin transition within the museum sector, offering new perspectives on governance and sustainability in cultural institutions.

Framing of the research. *The European Union has identified the "twin transition" as a key framework for tackling modern economic, environmental, and technological challenges, while simultaneously embedding digital advancements within sustainability strategies (European Commission, 2019). Recent studies explore different dimensions, such as, among others, the use of the Internet of Things (IoT) to improve operational sustainability in manufacturing companies (Rejeb et al., 2022) to facilitate the circular economy; the impact of digital technologies on eco-innovation in companies and the crucial role of digital transformation in promoting sustainable practices (Montresor & Vezzani, 2023); the business models for SMEs in the era of the twin transition, between leadership and sustainability (Gallina et al., 2024).*

The success of the twin transition depends on the development of multidisciplinary skills that combine resilience, digital technologies and specialised technical skills (Trevisan et al., 2024). Innovation ecosystems are central to driving the twin transition, a synchronised advancement of digitalisation and sustainability, by leveraging their unique characteristics and structural dynamics (Dal Mas et al., 2024). This collaborative environment accelerates technological development and integrates sustainable practices, making innovation ecosystems critical in addressing the dual challenges of digital and sustainable transformation (Tripathi et al., 2024).

One of the key strengths of innovation ecosystems is their ability to foster value co-creation through hybrid organisational models (Adner & Kapoor, 2010; Dodgson et al., 2013; Granstrand & Holgersson, 2020). These models bring together technological advances and market-driven solutions, enabling the development of products and services that are aligned with sustainability goals. The emphasis on digital innovation further supports this by creating platforms and networks that facilitate real-time interaction and resource optimisation. In addition, the dynamic structure of innovation ecosystems supports the iterative transformation process (Breslin et al., 2021). From this point of view, ecosystems provide pathways for industries and regions to navigate the complexities of the twin transition, providing a framework for specialised growth and co-evolution among so various ecosystem participants.

However, the realisation of the twin transition goals in digital innovation ecosystems is possible under a proper governance. Governance in digital innovation ecosystems manages interactions between actors, shapes decision-making processes and either facilitates or hinders innovation (Sjödin et al., 2024), and it is is directly responsible for achieving results through a path built on an appropriate balance between collaboration and competition (Primario et al., 2024).

Effective governance aligns diverse actors through coordination mechanisms, mutual trust, and clearly defined roles, enabling the collective pursuit of common goals (Hoffmann et al., 2023). Among the governance models, the laissez-faire governance model relies on minimal regulation, allowing the natural dynamics of the ecosystem to drive innovation. This model reflects self-organising networks in which actors operate autonomously, fostering spontaneous interactions and emergent outcomes (Könnölä et al., 2021). In contrast, the top-down governance model emphasises centralised control, with a dominant entity, such as a platform owner, defining rules and standards to ensure coordination across the ecosystem. This model ensures a high degree of coordination, but risks limiting the autonomy and diversity of ecosystem participants (Jacobides et al., 2018). Conversely, bottom-up governance models promote decentralisation and encourage collective decision-making and inclusivity. Closely linked to collaborative governance, this model thrives on horizontal cooperation and the active engagement of all actors (Mei et al., 2022). Among the main models discussed, the orchestration model, which is often led by a central actor or facilitator such as a university or technology hub, helps to mitigate power asymmetries and conflicts of interest and ensures the operation of the ecosystem (Wegner & Verschoore, 2022; Santos et al., 2022). Orchestrators facilitate collaboration by setting common standards, facilitating communication, and aligning the contributions of diverse participants (Santos et al., 2022). For example, orchestrators can act as platforms that unite stakeholders, enable co-creation of value, and address local or global challenges. Leadership in these ecosystems often combines top-down guidance with bottom-up participation, creating a balance that enhances adaptability and fosters multilateral conversations. This hybrid approach empowers actors to co-create the architecture of the ecosystem while benefiting from centralised coordination (Mei et al., 2022). It also involves managing criticalities, especially emergencies, as firms must navigate complex alliances and dependencies to build platforms that can support long-term innovation (Pushpananthan & Elmquist, 2022). Despite the models examined, existing research suggests that governance, scalability and stakeholder coordination remain key challenges that have not been sufficiently addressed (Shim et al., 2020; Sun et al., 2022). Additionally, the mechanisms that facilitate collaboration within these ecosystems require further investigation to maximize their advantages (Santos et al., 2023; Ferreira et al., 2023).

The twin transition is particularly relevant in the museum sector, as the integration of digital and green transitions in this sector promotes the adoption of digital technologies to increase operational efficiency, enhance visitor experience and support sustainable practices (Zhang et al., 2022). The twin transitions of museums have been embraced with different focuses and strategies, especially during and after the COVID-19 pandemic (Massari et al., 2024). These strategies have recently evolved and expanded towards a phygital approach - combining physical and digital elements (Iandolo et al., 2022), while increasing accessibility, as seen in examples such as "The Other Renaissance" at the National Archaeological Museum of Crotone (Balzani et al., 2024) and the Museo Egizio in Turin (Aulisio & Pereno, 2024). Immersive technologies such as virtual reality, augmented reality and the metaverse offer interactive experiences to a

wider audience (Iaia et al., 2024; Pironti et al, 2024; Longo & Faraci, 2023). These innovations also reduce the environmental impact of physical exhibitions, including visitor travel and exhibition set-up (Aulisio & Pereno, 2024). For example, virtual access to specific artworks eliminates the need to transport works to geographically distant exhibitions, thereby minimising environmental impact (Falk & Dierking, 2016). In addition, advanced digital systems optimise the use of energy and materials, contributing to greener museum practices.

Purpose of the paper. *The twin transition paradigm requires organisational and managerial skills to reimagine the museum offer and adapt governance models within its ecosystem (Reiman et al., 2021; Rehman et al., 2023). Although previous studies have focused on governance approaches in the management of innovation ecosystems, their role in digital innovation ecosystems is still lacking (Mei et al., 2022) and is essential to uncover their full potential.*

This study investigates the governance model in digital innovation ecosystems that enables the realisation of twin transition objectives, connecting different stakeholders with a common goal. The aim is to explore which and how the governance model facilitates the alignment of different actors to achieve digitalisation and sustainability goals in the museum sector.

Thus, the research question is: How does the governance model foster collaboration and innovation among actors belonging to digital innovation ecosystems?

Methodology. *This study adopts a qualitative research approach to examine the governance structures that support digital innovation ecosystems in achieving the goals of twin transition, with a particular focus on the museum sector. Using an instrumental case study method (Stake, 2013; Yin, 2009), the research explores a real-world phenomenon within its contextual setting to provide an in-depth, multifaceted understanding.*

The study regards a government-funded project led by the University of Turin in collaboration with research institutions, communication companies, start-ups and other stakeholders. The initiative aimed to revolutionise the museum experience by integrating emerging technologies such as augmented reality (AR), mixed reality (MR) and non-fungible tokens (NFTs) to enhance visitor engagement. Through an analysis of the 5G4C.A.P.10100 project, the research explores how governance frameworks facilitate stakeholder collaboration and promote both digital transformation and sustainability. Given the exploratory nature of the study, a qualitative approach is well suited to capturing the complexity of governance interactions in digital innovation ecosystems through understanding participants' experiences, identifying patterns and generating theoretical insights (Creswell & Poth, 2013).

To gather empirical data, the research team is conducting 20 in-depth interviews with key stakeholders, including representatives from research institutions, technology providers, museum staff and public authorities. These interviews provide different perspectives on governance mechanisms. The semi-structured format allowed for flexibility in exploring relevant themes while maintaining consistency with the research objectives. The study used projective techniques to address issues such as strategic goal setting, coordination processes, and the roles and interdependencies of ecosystem actors (Donoghue, 2010). To increase the accuracy of the research, a pilot test with an early questionnaire and a small number of volunteers helped to refine the interview protocol.

For data analysis, the study followed Yin's (2013) three-step process of (a) analysing individual interviews and transcripts, (b) identifying recurring themes, and (c) comparing themes across cases. Each transcript was treated as a distinct unit to capture personal experiences and emerging trends. The coding process was open-ended and flexible, rather than constrained by pre-defined categories (Huberman & Miles, 1994). Initial coding was carried out by the first author, while subsequent stages involved collaborative thematic aggregation by the research team. To ensure consistency and accuracy, the team reviewed a portion of the material to confirm the reliability of the coding process.

The twin transition setting: the museum ecosystem and the 5G4C.A.P.10100 project

The project aims to provide a first experiment to move the museum ecosystem towards the twin transitions of increasing operational efficiency, improving visitor experience and supporting sustainable practices. Each step of the project delivers a digital artefact that increase the usability of the museum's content both online and offline, enhance the museum and the territory's heritage, and give life to a narrative that generate greater user engagement and involvement. At the end of this process, the assemblage of innovative, immersive, replicable and adaptive experiences promote the digital and green transition of the museum ecosystem, with social and economic implications. A narrative thread connects the experiences and use cases presented here, the commemoration of Ayrton Senna on the thirtieth anniversary of his death, enabled by a technological thread, the adoption of emerging technologies.

Partners from different sectors formed the ecosystem, including the ICxT Interdepartmental Innovation Centre, the Department of Computer Science of the University of Turin and the University of Turin: virtual, augmented and mixed reality research area, LINKS Foundation; telecommunications, TIM SpA; museum, National Automobile Museum of Turin, ETT SpA; startups in NFT, AI and Metaverse technologies, such as Carbonlab Srl, AnotheReality Srl; communication, such as Tree Srl; and Formula 1, such as the Imola International Autodrome "Enzo and Dino Ferrari"; and public institutions, such as the City of Turin and Turin City Lab.

The project included three experiences (from this, the C.A.P. acronym):

- *Circuito - in English, circuit/racetrack. The Circuito experience focused on VR and immersive content production, allowing users to explore in 3DOF (degrees of freedom) through 360-degree videos and images.*
- *Auto -Car-. The Auto experience offered users a 6DOF exploration of futuristic cars recreated using 3D technology, allowing them to navigate virtual environments such as cities or outdoor scenarios.*

- *Pilota -Pilot-. The Pilota experience introduced 'Futura', an AR-based virtual guide that tells the story of motor racing in MR mode through notable cars from the National Automobile Museum's collection. Two additional avatars, 'Arduino' and 'Professor', complemented the experience by explaining the technologies used in the project and outlining its objectives, partnerships and progress.*

There are also two other use cases:

- *the Museum Experiential Wallet, which allows users to collect NFT tokens linked to the storytelling of the 5G4C.A.P10100 project.*
- *the Metamuseum, a repository of all project content in an immersive 3D environment, accessible via VR headsets or PC desktops. This virtual space serves as a permanent or temporary exhibition, combining content about Ayrton Senna with material sourced globally and produced using emerging technologies.*

Each experience starts from the digitisation of museum or partner artefacts - for example, the Automobile Museum and the Imola Autodrome. Several actors have created and published the digital outputs, which have been enhanced in terms of technology and content by other actors. All experiences are alternatively available from smartphone, PC and/or VR/MR viewers to increase the level of interaction and immersion.

Results. *The expected results of the case study concern the theoretical, managerial and social implications of the research.*

The theoretical implications will contribute to the governance models able to facilitate the twin transition in digital innovation ecosystems, also highlighting the internal dynamics between actors and their different roles, while promoting collaboration, knowledge sharing and scalable solutions (Shim et al., 2020; Hoffmann et al., 2023). This could highlight how digital ecosystems enable value co-creation and innovation through their capabilities (Granstrand & Holgersson, 2020; Zhang et al., 2023), which is a crucial aspect and could have further implications for addressing the technological and organisational challenges of the twin transition (Jacobides et al., 2018; Hoffmann et al., 2023). Such implications are also relevant to the field of cultural industries, where there is a need for further research advances in the elicitation of an effective governance model, particularly in the direction of a twin transition (Zhang et al., 2022).

From a managerial perspective, the empirical analysis will provide valuable guidance for project leaders and ecosystem managers seeking to implement governance models for digital innovation ecosystems while promoting innovation, sustainability and shared outcomes. The approaches outlined will provide practical frameworks for navigating the complexities of digital innovation ecosystems and facilitating the twin transition. Indeed, the expected outcomes will identify governance approaches that facilitate stakeholder relationship management while enabling the scalability of digital innovation ecosystems in the museum sector. This will also suggest if and which governance model for twin transition principles facilitates the achievement of successful ecosystem outcomes and broader cultural innovation.

The expected social impacts relate to how digital innovation ecosystems can improve accessibility to cultural heritage, promote inclusivity and contribute to sustainability goals. This is based on the platforms enhancing social sustainability by expanding accessibility and inclusivity, providing flexible and diverse exhibitions that foster international interactivity, and creating increasingly engaging visitor experiences (Hao & Wang, 2024).

Research limitations. *This study presents a governance framework for implementing the twin transition within digital innovation ecosystems in the museum sector. Although based on a single case, it serves as a first step towards a deeper understanding of the issue. Future research could extend this work by conducting comparative analyses across different sectors, in order to further validate and enhance the proposed model.*

Originality of the paper. *The novelty of the research lies in the importance of addressing the twin transition in the museum ecosystem. It seeks to understand which governance and relational models can address this pathway and its outcomes in terms of environmental, cultural, social and economic sustainability within the museum industry.*

Key words: *digital museum innovation ecosystem, twin transition, governance model, digitalization, green transition, sustainability*

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Social Media and Smart Cities: Cultural Proximity as a Key to Digital Engagement

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Abstract

Smart cities increasingly use social media as an urban marketing tool for tourism promotion and stakeholder engagement. However, how cities adapt their digital strategies and adopt social media to engage intra-national (national) and inter-national (foreign) users remains under-explored.

This study examines the role of social media responsiveness in shaping engagement with these distinct publics, considering cultural proximity as a key factor influencing digital interactions. Using a longitudinal panel of 18 Italian cities (2010-2024), we assess the diversification of social media adoption through the Herfindahl index, while controlling for urban and economic characteristics.

The results show that greater social media responsiveness is associated with greater engagement of both user groups, although the dynamics of engagement vary. Intranational users tend to interact more with city content, while international users face additional linguistic and cultural barriers, despite the role of digital platforms in facilitating global reach.

Integrating insights from smart city marketing, destination branding and digital governance, this study provides theoretical contributions and practical applications on how cities can optimise digital communication strategies to improve tourism flows, strengthen relationships with stakeholders and reinforce urban attractiveness. Several recommendations for managers and politicians in the sector can be drawn from this to optimise digital strategies in terms of tourist attractiveness and stakeholder involvement to encourage the participation of the various parties involved.

Framing of the research. *Smart cities represent a strong interconnection between technological, economic, social, cultural and tourist activities (Vanolo, 2014). The continuous transformation of smart cities has pushed managers to adopt a vision of entrepreneurial urban planning whereby it is important to achieve certain criteria of inclusivity, sustainability and efficiency (Kummitha, 2018). In addition to pursuing these objectives, it is also important to develop effective marketing strategies to promote urban development, the attractiveness of cities as tourist destinations and the involvement of stakeholders (Christofi et al., 2021; Coca-Stefaniak, 2019, 2021).*

Thanks to social media, urban marketing has evolved considerably, enabling dialogue with different audiences and improving urban visibility (Christofi et al., 2021; Marchesani, Masciarelli, & Ceci, 2024). In particular, the interactive nature of social media facilitates two-way communication that allows cities to dialogue with different targets, receiving feedback aimed at improving urban services and policies concerning the alignment of public needs (Buhalis & Law, 2008; Molinillo et al., 2019). Therefore, social media platforms have profoundly transformed urban communication by offering different opportunities for branding, engagement and interaction (Fernández-Cavia et al., 2016; Hays et al., 2013; Molinillo et al., 2019; Sano et al., 2024).

Using these digital tools, a city can benefit from destination marketing, enhancing the attractiveness of a city, for example, by promoting cultural, historical and infrastructural assets for residents and visitors (De noni et al., 2014). Destination marketing is often linked to events or seasonal factors (Goffi & Cucculelli, 2019). While existing research has explored the role of social media in tourism promotion, how cities adopt their digital strategies to cater to their main target audiences, both national and international, is still little explored. Regarding the international audience, linguistic and cultural barriers strongly influence communication. While national tourists share the same language and culture as the city, international visitors face information asymmetries that social media could help to overcome (Gretzel et al., 2006).

This study aims to explore how smart cities use social media to engage their national (intra-national) and international (inter-national) audiences in different ways. Therefore, the study examines whether greater responsiveness to social media trends increases the engagement of these two groups, considering cultural proximity as a moderator of digital interactions.

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RQ: Does the responsiveness of cities to social media trends have a different impact on national (intra-national) versus international (inter-national) audience engagement?

Purpose of the paper. *The study aims to examine the role of social media responsiveness in shaping the engagement of the two audiences considered, assessing cultural proximity as a key factor capable of shaping digital interactions. According to Kiráľová & Pavlíceka (2015), social media can increase the competitiveness of a destination by raising awareness among a global audience. Social media favours tourism promotion (Mao et al., 2019) and destination branding (Fernández-Cavia et al., 2016; Huerta-Álvarez et al., 2020). Effective destination marketing must be aligned with useful strategic objectives and consistent with all stakeholders (Christofi et al., 2021), whether they are national or international tourists, and it is essential to respond to the needs and requirements of multiple stakeholders (Wall & Mathieson, 2006; Xiao, 2013). A crucial element that differentiates national tourists from international tourists is cultural proximity, i.e. diversity in terms of language, traditions and shared values of a destination (Berry, 1979). The greater the cultural proximity, the more familiarity there will be with the destination, which increases the satisfaction of the tourist experience and favours a positive image of the destination (Richardson & Crompton, 1988).*

From these considerations, the following hypotheses emerge:

H1: The higher the responsiveness to social media issues, the greater the interaction with intra-national tourists.

H2: The higher the responsiveness to social media trends, the greater the interaction with international tourists.

Domestic tourists are residents of a specific region who travel to visit nearby cultural and tourist attractions.

Domestic tourists are residents of a specific region who travel to visit nearby cultural and tourist attractions, but in places other than their hometown. Effective marketing strategies are essential to attract and meet the needs of local tourists (Hughes & Allen, 2005). The more a city responds to the needs and preferences of local tourists, the more mutually beneficial the interactions become (Aladwani, 2015). In this way, domestic tourists can play an active role in the development of smart cities (Braun et al., 2013; Molinillo et al., 2019).

However, considering the deep globalisation, cities are trying to address an international tourist audience. Social media, thanks to the multiplicity of information shared, can encourage foreign tourists to visit a city to get to know it better. Therefore, cities are increasingly seeking to engage not only local stakeholders, such as local tourists, but also foreign tourists (Hudson & Thal, 2013). A destination's engagement with tourists can positively influence tourist behaviour (Tse & Tung, 2022) by increasing interaction, improving the experience and co-creating value (Kumar & Kaushik, 2020). The involvement of and attention to tourists' needs could favour and feed their advocacy role towards the destination (Lever et al., 2021), leading to the spread of positive word of mouth (WoM) to the rest of the public (Trunfio et al., 2019). However, although many factors attract international tourists, their level of involvement can be hindered by, for example, linguistic, cultural and regulatory diversity, as well as the uncertainty that surrounds an unknown and previously unvisited place. Therefore, foreign tourists may be less involved in city life due to their cultural distance and lack of knowledge of the local language and traditions. Social media can help overcome this potential uncertainty (Gretzel et al., 2006; Yang et al., 2019). Internet accessibility and use play a crucial role in overcoming the barriers dictated by cultural distance that often hinder tourist flows to some countries, as these platforms offer a possibility for intercultural communication (Marcoccia 2012). Social media and the Internet therefore provide tourists with easy access to a vast amount of information that facilitates cultural adaptation, thus reducing the uncertainty and perceived risk of an unknown culture (Money & Crotts 2003). Based on the previous discussion, we believe that communication and involvement of tourists can be facilitated by social media, which can help overcome the uncertainty and barriers typical of cultural distance (Gretzel et al., 2006). The more the city adapts and responds to the needs of international tourists, the more positive effects can be obtained for the city, including international tourists as active and crucial subjects in the development of the smart city (Harrigan et al., 2017; Kumar & Kaushik, 2020; Leung & Bai, 2013; Tse & Tung, 2022).

Methodology. *The study to answer the research question adopts a longitudinal panel composed of 18 Italian cities over 14 years, from 2010 to 2023. The evaluation of the cities' responsiveness to social media trends is carried out using the Herfindahl index, which allows us to examine changes in the adoption of digital platforms and the effects on public engagement. Italy is a country where tourism is increasingly oriented towards small destinations (Goffi & Cucculelli, 2019).*

The data used in this study comes from primary (Wayback Archive and official websites) and secondary (national and international databases) sources. The data considered in this panel allowed us to test and validate our hypotheses considering various characteristics of the city and different levels of digital, economic and urban development, in line with the literature on urban studies (Glaeser, 2000; Holmes et al., 2000; Marchesani et al., 2023). Regarding the variables related to social media (platforms and internal and international users), we focused exclusively on the platforms officially listed on each city's website. The dependent variables in this study represent (i) intra-national users and (ii) inter-national users. Intra-national users are defined as those residing in Italy, while international users are defined as those residing outside of Italy. The independent variable of this study, Social Media Responsiveness (SMR), evaluates the extent to which cities adopt new and trendy social media platforms over time. Specifically, it tracks the annual adoption of different platforms by each city. To quantify this data, we created a binary indicator for each platform, assigning a value of 1 if the platform was actively implemented by the city each year and 0 otherwise. This approach

allows us to follow the evolution of each city's digital engagement strategies. Data for this variable was collected retrospectively using the Wayback Machine (https://archive.org).

To further analyse the concentration of platform adoption, we calculated the Herfindahl-Hirschman Index (HHI) for the annual adoption of social media in each city. The HHI provides a measure of the diversity (or lack thereof) of platforms used by each city, serving as an indicator of a city's adaptability to evolving social media trends. Lower HHI values indicate a more diversified approach, where cities utilise a range of platforms to reach different audiences. Conversely, higher HHI values reflect a concentrated strategy, with cities focusing on a smaller number of more established platforms and a narrower audience. To aid interpretation within our model, we have reversed the HHI values: higher values now indicate greater social media heterogeneity (a wider range of social media platforms), while lower values indicate greater homogeneity (fewer more established platforms).

In addition, we included urban variables such as population, GDP, city size and city development to account for potential bias due to city-specific characteristics within the studied relationship, in line with the literature on urban agglomerations (Glaeser, 2000; Holmes et al., 2000). Considering the technological nature of the phenomenon, we also analysed the cities' public investments in R&D. Finally, given the continuous interaction with the external environment, we included the number of airports as a proxy for the cities' openness (Gambardella et al., 2009). The inclusion of these variables allows us to circumscribe the phenomenon and reduce the potential biases deriving from specific city attributes. To test our hypotheses, we applied the Generalised Least Squares (GLS) estimation method with a dependent variable delayed by one year to consider potential autocorrelation and address endogeneity issues. The GLS method was chosen for its robustness in dealing with panel data with heteroscedasticity and autocorrelation between units, guaranteeing consistent and efficient parameter estimates (Bai et al., 2021; Bamati & Raoofi, 2020). To validate the use of the GLS model in our analysis, we applied several diagnostic tests to ensure robustness and address potential model specification problems (Baum et al., 2003). The study used the Wald Chi² test to assess the joint significance of the explanatory variables, Moran's I test to detect spatial autocorrelation in the residuals, and Hausman test to confirm the suitability of the GLS compared to alternative specifications such as fixed-effects and random-effects models (Debarsy, 2012). In addition, we tested for multicollinearity among the independent variables, confirming that none of the correlations represented a problem (Jaccard et al., 1990).

Results. *The findings of this study provide preliminary evidence regarding the relationship between social media responsiveness and digital engagement among intra-national and inter-national audiences. The analysis suggests that a higher degree of responsiveness to social media dynamics is associated with increased engagement across both user groups, albeit with varying degrees of intensity. This result supports the hypothesis that cities that actively adapt their digital strategies to emerging trends in online platforms foster a more interactive and participatory environment, particularly among national audiences. Concerning intra-national users, the results indicate that cities exhibiting a greater level of social media responsiveness tend to experience a significant increase in digital engagement. This finding aligns with prior research emphasizing the role of digital communication in reinforcing local participation and strengthening community interaction. The ability of cities to promptly integrate new digital tools and engage in dynamic interactions appears to facilitate deeper connections with local stakeholders, thereby enhancing urban branding and fostering a sense of local belonging. These findings lend support to the hypothesis that higher social media responsiveness translates into stronger engagement among domestic users, reinforcing the notion that timely, interactive, and citizen-centered digital strategies enhance the digital presence of cities within national boundaries. Regarding inter-national audiences, the results similarly indicate a positive relationship between social media responsiveness and engagement. However, the magnitude of this effect appears to be lower than that observed for domestic users. This suggests that while a proactive approach to social media trends contributes to increased visibility and interaction among foreign users, additional factors may influence their digital engagement. Elements such as linguistic accessibility, cultural familiarity, and targeted marketing efforts likely play a crucial role in shaping how international audiences interact with urban digital content. These insights support the hypothesis that social media responsiveness enhances engagement among international tourists but also highlight the need for complementary strategies to mitigate cultural and informational asymmetries that may limit their participation.*

Beyond social media responsiveness, the analysis underscores the influence of several urban characteristics on digital engagement. Larger cities, characterized by greater institutional capacity and technological resources, tend to exhibit higher levels of interaction among both domestic and foreign users. Similarly, economic prosperity, measured through indicators of city development and GDP per capita, is associated with increased digital engagement, suggesting that municipalities with stronger economic foundations may allocate more resources to digital infrastructure and marketing initiatives. Additionally, factors such as tourism inflows, the presence of major events, and global connectivity through transport infrastructure contribute to shaping the patterns of online interaction, reinforcing the idea that urban attractiveness and accessibility are key determinants of digital participation.

These preliminary findings provide insights into the evolving role of social media in urban marketing and destination branding. They suggest that while responsiveness to digital trends is a critical enabler of engagement, particularly within national markets, international audiences may require more tailored strategies to overcome linguistic and cultural barriers.

Research limitations. *Despite its contributions, this study has several limitations. First, the analysis is confined to the Italian context, which, while offering valuable insights, limits the generalizability of the findings to other geographical*

areas. Future research should extend the scope to other countries to explore potential differences arising from economic, social, and cultural contexts. Second, the sample of cities could be expanded to include a broader range of urban centers, differentiating between small and large destinations. This would allow for a more nuanced understanding of how city size influences digital engagement and stakeholder interactions, particularly about tourism attractiveness and urban marketing strategies. Third, this study does not account for generational differences among tourists, which could significantly affect engagement patterns. Future research should examine how digital responsiveness varies in its impact on different age groups, as younger generations might engage differently with urban digital platforms compared to older tourists.

Moreover, this study primarily focuses on social media responsiveness but does not explicitly consider the role of platform-specific algorithms, advertising strategies, or user-generated content in shaping engagement. Future investigations could incorporate these dimensions to assess the interplay between organic and paid digital strategies in driving user interaction. Finally, the study does not analyze the long-term effects of social media responsiveness on urban attractiveness and economic development. A more extensive longitudinal approach could provide deeper insights into how sustained digital engagement translates into tangible benefits for cities, such as increased tourism flows, investment attraction, and stakeholder collaboration.

Managerial implications. *The study offers various managerial implications for destination marketing managers, identifying the tools with which to communicate with different audiences and stakeholders, whether they are international or national tourists. These are valuable insights that can enable smart cities to develop digital strategies that can create greater involvement of the various stakeholders and improve the promotion of a destination to tourists. Taking cultural proximity into account is an essential aspect of shaping digital strategies so that they are effective for different tourist targets. These insights into smart city marketing, destination branding and digital governance can be particularly valuable for optimising digital communication strategies to encourage greater tourist flows, improve interaction with different stakeholders and increase urban attractiveness. Local policy makers could understand which strategies can make cities more attractive, both for residents and visitors, improving their reputation at a national and international level (Boivin & Tanguay, 2019; Jan & Beesau, 2010) and increasing their competitiveness as tourist destinations (Goffi & Cucculelli, 2019).*

Originality of the paper. *The originality of the study lies in the perspective with which social media are analysed as tools capable of conveying strategies that can involve the public more in the cultural, tourist and social activities carried out by smart cities. Social media allows for a degree of interaction and involvement with international tourists, overcoming the barriers dictated by cultural and linguistic distance that could represent an obstacle for this target group of consumers who may consider a foreign city particularly risky and uncertain. The study therefore adopts a dual perspective, analysing both the national and international public, highlighting differences and similarities within them.*

Key words: *social media; urban marketing; smart cities; cultural proximity; Italy; digital engagement*

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Film-induced tourism: the influence of "My brilliant friend" TV series on tourist perceptions

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Abstract

This study investigates the impact of the TV series "My Brilliant Friend" on tourists perceptions in film-induced tourism. By leveraging the Theory of Planned Behavior (TPB), alongside novel constructs such as nostalgia and authenticity-seeking behavior, the research examines how on-screen depictions influence tourists' emotions, attitudes and travel intentions. The study adopts a Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze data collected via an online survey from fans of the series. Preliminary findings suggest that film-induced tourism enhances destination awareness, emotional engagement and motivation to visit, but also raises concerns regarding authenticity and potential misrepresentation. This research contributes to the broader discourse on destination marketing and management, offering valuable insights for policymakers and tourism stakeholders.

Framing of the research. *The use of landscapes in cinema is deeply intertwined with audience perception and cultural heritage dissemination. Cinematic landscapes serve as semiotic devices, encoding cultural values, traditions and identities within visual narratives (Connell, 2012; Shambu 2019). This interaction between film and viewer underscores the importance of destination marketing and management in tourism, as film-induced tourism is not merely a byproduct of media influence but a structured process where cultural heritage is interpreted and shared.*

By engaging with a location through audiovisual storytelling, the audience form preconceptions about a place before physically experiencing it, reinforcing or altering its perceived identity (Eppler & Burkhard, 2007; Nieto-Ferrando et al., 2023).

Film-induced tourism is a multifaceted phenomenon encompassing various subcategories such as cinematic tourism, media tourism and symbolic pilgrimage (Karpovich, 2010). These different conceptualizations highlight the varying degrees to which filmic representations influence tourists' motivations.

Accordingly, some visitors seek an immersive cinematic experience, tracing the steps of their favourite characters, while others engage with the destination's historical and cultural layers beyond the screen. The ethnographic imagination associated with film locations allows viewers to experience places vicariously, influencing their travel behaviors and expectations (Trifuoggi & Sielo, 2023).

Additionally, contemporary research emphasizes the role of virtual communities in film-induced tourism. Online platforms, fan forums and social media channels provide spaces where users exchange travel tips, discuss representations of places, and validate or contest the authenticity of portrayed locations (Kim & Kim, 2020).

This research builds upon these concepts, exploring how "My Brilliant Friend" functions as a catalyst for cultural knowledge and destination image formation. By examining the interplay between cinematic representation and tourist behavior, this study contributes to the growing discourse on film-induced tourism and cultural identity construction.

This work in progress is positioned within the interdisciplinary fields of film-induced tourism and behavioral psychology. Film-induced tourism has been widely recognized as a powerful force in shaping tourists' perceptions and influencing travel behavior (Beeton, 2005; Hudson & Ritchie, 2006). The depiction of places in cinema and television plays a crucial role in constructing destination images and fostering emotional connections with viewers (Connell, 2012).

By integrating the Theory of Planned Behavior (TPB) (Ajzen, 1991) with constructs such as nostalgia (Kim et al., 2019) and authenticity-seeking behavior (Lee et al., 2020), this research bridges the gap between media studies and tourism behavior analysis. In particular, the study focuses on the representation of Naples in "My Brilliant Friend" and

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its effects on tourists' emotions and intentions. The research also acknowledges the risks associated with an over-commercialized portrayal of destinations, which may lead to visitor dissatisfaction due to potential discrepancies between the mediated image and reality (Karpovich, 2010).

The study contributes to the existing literature by emphasizing the dynamic interaction between audiovisual representations, tourist perceptions and intention to visit the destination.

Purpose of the paper. *This study aims to examine how the TV series "My Brilliant Friend" influences tourists' emotions, perceptions and intentions regarding Naples. It explores how the series shapes viewers' perceptions of the city as a tourist destination, considering the power of audiovisual media in constructing destination images (Hudson & Ritchie, 2006). Additionally, it investigates the role of nostalgia in fostering emotional connections with the locations depicted, acknowledging its influence on travel motivation and personal experiences (Kim et al., 2019; Song et al., 2024). The study also considers authenticity-seeking behavior, assessing how tourists evaluate and expect real-life experiences to align with their mediated impressions (Lee et al., 2020).*

Beyond analyzing tourist behavior, the research examines the broader implications of film-induced tourism for destination management. In particular, it evaluates how cinematic portrayals can contribute to sustainable tourism development and cultural preservation while also identifying risks associated with the over-commercialization of a location's image (Saltik et al., 2011). By integrating perspectives from tourism studies and behavioral psychology, this study provides valuable insights for destination marketers and policymakers seeking to optimize media-based tourism strategies while maintaining the authenticity of the places represented (Quintal & Phau, 2015).

The proliferation of online communities has transformed the way potential visitors access and interpret information about a destination. The digital sharing through forums, travel blogs and fan pages creates an online environment where perceptions of authenticity and nostalgia are continuously negotiated (Souza et al., 2020). By analyzing these digital interactions, this study highlights how online discourse influences tourists' pre-visit expectations and post-visit reflections, reinforcing the significance of virtual engagement in shaping destination reputation.

The TPB provides a structured framework for understanding how exposure to a TV series influences tourists' behavioral intentions (Ajzen, 1991), but additional constructs such as nostalgia (Kim et al., 2019) and authenticity-seeking behavior (Lee et al., 2020) enrich the analysis by considering the emotional and cultural dimensions of travel motivation.

Therefore, this study seeks to expand the TPB framework by demonstrating how cultural narratives embedded in audiovisual content generate emotional connections that drive travel decisions.

Additionally, the role of cinematic nostalgia in enhancing a sense of familiarity with a destination is a crucial aspect of this research. Films and TV series often create emotional touchpoints with audiences, leading to the formation of an affective bond between the viewer and the depicted location (Frow, 1991). This phenomenon is particularly relevant when exploring "My Brilliant Friend", as its setting in Naples evokes both personal nostalgia (viewers recalling past visits or cultural ties) and mediated nostalgia (viewers longing for an imagined past inspired by the series) (Raymond et al., 2011). By analyzing these dimensions, the study sheds light on how nostalgia-driven tourism influences the construction of a destination's identity and perceived authenticity.

Ultimately, this research does not merely examine tourists' behavioral intentions but also considers how audiovisual media contribute to digital engagement, and destination meaning-making. These findings are relevant for destination marketers, tourism boards and cultural stakeholders aiming to optimize film tourism strategies while preserving the integrity and authenticity of the places represented on screen.

Methodology. *The study employs a quantitative research approach using Partial Least Squares (PLS), a variance-based method for Structural Equation Modeling (SEM) that is particularly useful for analyzing complex relationships between latent variables (Hair et al., 2014). This methodology allows for the examination of tourists' behavioral intentions and perceptions by integrating constructs from the TPB (Ajzen, 1991) along with novel dimensions such as nostalgia (Kim et al., 2019) and authenticity-seeking behavior (Lee et al., 2020).*

To collect data, an online survey was administered via Google Forms between March and June 2024. The survey targeted members of "My Brilliant Friend" fan groups on Facebook, ensuring engagement from individuals with prior exposure to the series.

Participants were required to confirm whether they had watched the series and visited Naples before proceeding with the questionnaire.

The survey was structured into three sections: an introductory part analyzing the development of movie tourism in Naples, a second section comprising 18 items measured on a seven-point Likert scale (Podsakoff et al., 2003) and a final section capturing demographic data and interest in Naples-related tourism activities.

A total of 520 responses were collected, but after screening for incomplete answers and participants who had neither watched the series nor visited Naples, the final sample consisted of 451 respondents.

The sample size met the statistical power requirements suggested by Cohen (1988) and Green (1991), confirming its adequacy for PLS-SEM analysis. Data were processed using Smart-PLS software, allowing for an in-depth assessment of the relationships between latent constructs and tourist behavior.

This methodological framework provides a robust foundation for understanding the impact of audiovisual media on destination image, nostalgia-driven tourism and the authenticity expectations of visitors.

The choice of an online survey as the primary data collection method was driven by the need to reach a geographically diverse audience, particularly international viewers of "My Brilliant Friend". Given the global reach of the series, a

digital approach ensured the inclusion of respondents who may have been influenced by the show but had varying degrees of prior exposure to Naples.

To minimize potential biases, the survey was carefully structured to ensure a comprehensive assessment of participants' experiences and perceptions. The questionnaire began with an introductory section that examined respondents' awareness of film-induced tourism and their general views on "My Brilliant Friend" and its portrayal of Naples. This was followed by a section designed to measure behavioral constructs using a seven-point Likert scale, based on established methodologies in TPB-based tourism research. The final part of the survey focused on collecting demographic information, including gender, age, nationality, and interest in participating in Naples-themed events.

Before its full distribution, the survey was pre-tested with a sample of 50 respondents to evaluate clarity, internal consistency and the validity of measurement items (Podsakoff et al., 2003).

Based on the feedback received, minor adjustments were made to improve question wording and ensure alignment with the study's objectives. This pilot phase strengthened the reliability of the instrument and reduced the risk of misinterpretation among participants.

Given the reliance on self-reported data, particular attention was paid to controlling for potential biases in responses. To address common method variance (CMV), the study employed Harman's single-factor test, a widely recognized statistical technique used to detect distortions caused by common method bias (Podsakoff et al., 2003). The test results confirmed that no single factor accounted for a majority of the variance, indicating that self-reporting bias did not significantly impact the dataset.

The final dataset consisted of 451 valid responses, meeting the recommended sample size for PLS-SEM analysis (Cohen, 1988; Green, 1991). This ensured that the study met the statistical power threshold required for robust model estimation and hypothesis testing. By leveraging these methodological rigor techniques, the research provides a reliable and in-depth analysis of the relationship between cinematic representation, nostalgia, authenticity, and tourist decision-making.

Results. *The preliminary findings confirm the significant influence of audiovisual media on tourists' perceptions and travel intentions. The analysis demonstrates that "My Brilliant Friend" has played a crucial role in shaping the image of Naples as a cultural and historical destination, reinforcing its appeal among international audiences.*

The portrayal of the city in the series evokes strong emotional responses, particularly nostalgia, which emerges as a key factor in motivating visits (Kim et al., 2019; Song et al., 2024). Viewers develop an attachment to the locations depicted, leading them to seek a tangible connection with the settings they have seen on screen.

The study further highlights the impact of authenticity-seeking behavior on tourists' expectations and satisfaction (Lee et al., 2020). Respondents who perceived Naples as authentically represented in the series were more likely to express a strong intention to visit.

However, discrepancies between cinematic portrayals and real-life experiences can lead to dissatisfaction, emphasizing the importance of balanced destination marketing strategies (Karpovich, 2010).

Quantitative analysis using PLS-SEM reveals significant relationships between TPB constructs (attitude, subjective norms and perceived behavioral control) and tourists' intentions to visit Naples.

Additionally, nostalgia and authenticity-seeking behavior exhibit positive correlations with travel motivation, reinforcing the idea that emotional and experiential factors drive film-induced tourism (Quintal & Phau, 2015).

The preliminary findings reinforce the increasing significance of audiovisual media in shaping perceptions of tourist destinations.

The representation of Naples in "My Brilliant Friend" has played a pivotal role in constructing an image of the city as a rich cultural and historical destination, influencing both domestic and international audiences (Hudson & Ritchie, 2006). Viewers who had not previously considered Naples as a travel destination reported heightened interest in visiting, demonstrating how exposure to audiovisual narratives can shift perceptions and create new tourism demand.

One of the key findings of the study is the role of nostalgia as an emotional driver in tourist decision-making. The series' setting, infused with evocative depictions of Naples' post-war neighborhoods, narrow alleys and vibrant street life, resonated deeply with audiences, triggering nostalgia both for personal memories and for an imagined past constructed through cinematic storytelling (Kim et al., 2019; Song et al., 2024).

Respondents who reported a strong emotional connection to the series were more likely to express an intention to visit Naples. This supports existing literature on the influence of media nostalgia in driving tourism motivation (Frow, 1991; Raymond et al., 2011).

Furthermore, the study highlights the importance of authenticity-seeking behavior in film-induced tourism. Respondents who perceived the portrayal of Naples in "My Brilliant Friend" as authentic were significantly more inclined to visit.

Elements such as language, architecture and cultural traditions depicted in the series contributed to this perception, reinforcing the idea that tourists value realism in media representations (Lee et al., 2020).

Some respondents noted concerns that Naples, as presented in the series, might differ from its current reality, aligning with previous research warning against the over-commercialization of film tourism sites (Karpovich, 2010).

The preliminary results further support the role of attitudes, subjective norms and perceived behavioral control in predicting tourist behavior.

Positive attitudes toward Naples, influenced by the emotional resonance of the series, emerged as the strongest predictor of intention to visit.

Subjective norms, such as peer and family influence, also played a role, with many respondents expressing interest in visiting Naples because friends or social circles had also watched the series and expressed enthusiasm for the destination.

Perceived behavioral control, particularly related to accessibility and safety, was found to be an important factor in decision-making, reinforcing findings from previous studies on destination choice (Quintal & Phau, 2015).

An additional interesting aspect that emerged from the responses is the influence of virtual engagement and online communities in reinforcing destination interest. Many respondents had previously participated in online discussions about "My Brilliant Friend" or had read travel recommendations based on the series before considering a visit. This supports existing literature on the role of digital communities in tourism behavior.

Tourists who actively engaged with fan communities were more likely to report a strong desire to visit, demonstrating that online discourse serves as an extension of the cinematic experience (Du et al., 2020; Lao et al., 2023).

Overall, the preliminary results of this study indicate that film-induced tourism extends beyond mere location exposure and involves a complex interplay of emotional connection, perceived authenticity and behavioral intent.

Research limitations. *While the study provides valuable insights into the relationship between film-induced tourism and destination perception, several limitations should be acknowledged. First, the research relies on self-reported data collected through an online survey, which may be subject to response bias and social desirability effects (Podsakoff et al., 2003).*

Participants' recollections and interpretations of "My Brilliant Friend" may have influenced their responses, potentially affecting the accuracy of their stated intentions and perceptions.

Second, the sample consists primarily of individuals who are already engaged with the TV series through fan communities, which may not fully represent the broader tourist population. This targeted sampling approach, while ensuring that respondents had prior exposure to the series, limits the generalizability of the findings to all visitors to Naples. Therefore, future research could expand the scope by incorporating a more diverse audience, including those with no prior knowledge of the series.

Third, the study focuses on a single case Naples as depicted in "My Brilliant Friend", which restricts the applicability of the findings to other film-induced tourism destinations. The success of the TV series has benefited the image of Naples as a destination. However, this is not solely influenced by the popularity of the series but also by other factors that have not been analyzed in this study, as they fall outside the scope of the research.

Finally, while the study employs a robust statistical approach using PLS-SEM, the cross-sectional nature of the data collection prevents an assessment of long-term changes in tourists' perceptions and behaviors over time (Hair et al., 2014). A longitudinal study could provide deeper insights into how media representations influence travel decisions in the long run.

Despite these limitations, the study contributes to the growing body of literature on film-induced tourism and offers a strong foundation for future research on media influence, nostalgia-driven travel, and authenticity-seeking behavior.

Managerial implications. *The preliminary findings of the study underscore the necessity for destination managers and tourism marketers to develop strategic approaches that maximize the benefits of film-induced tourism while preserving the authenticity of the location.*

Given the strong emotional engagement generated by "My Brilliant Friend", marketing strategies should not only promote filming locations but also curate experiences that align with the expectations of nostalgia-driven tourists. Tourists drawn to Naples through the series are likely seeking cultural depth and emotional resonance, rather than simply visiting a list of filming locations. To enhance visitor satisfaction, destination managers can design immersive, story-driven tours that integrate historical context, literary connections and local narratives, ensuring that tourists engage meaningfully with the city's identity (Lee et al., 2020).

A key aspect of film tourism management is the balance between commercialization and authenticity. While cinematic exposure can significantly boost tourist interest, overly commercialized strategies risk distorting visitor expectations (Karpovich, 2010).

A careful approach should be adopted when incorporating "My Brilliant Friend" into tourism branding. Instead of artificially reconstructing the series' settings, tourism boards should focus on highlighting authentic elements of Neapolitan culture, architecture and traditions that align with the show's portrayal. Collaborations with local historians, writers, and cultural institutions could help create guided experiences that maintain a balance between fictional representation and historical reality.

Moreover, fan communities play a crucial role in disseminating travel-related information and shaping perceptions of authenticity (Han & Bae, 2022). Destination managers should engage with these virtual communities by curating high-quality digital content, such as interactive maps of filming locations, behind-the-scenes insights and user-generated storytelling initiatives. By leveraging social media and online platforms, tourism stakeholders can co-create content with fans, fostering organic engagement and enhancing the perceived credibility of information.

Another managerial implication concerns the potential economic and social impact of film tourism on local communities. Increased visitor flows to "My Brilliant Friend"-related locations could lead to both opportunities and challenges. On the one hand, small businesses, local artisans and hospitality firms stand to benefit from heightened tourism demand. On the other hand, there is the risk of gentrification and overcrowding in areas that may not have the infrastructure to handle a surge in tourists (Leotta, 2020).

To mitigate these risks, tourism planners should adopt sustainable strategies, such as spatial distribution of tourist flows, encouraging visits to less frequented but culturally significant sites. By diversifying the tourism offer, it is possible to prevent excessive concentration in specific neighborhoods while promoting a broader and more sustainable economic impact.

Furthermore, when a series goes viral, the widespread sharing on social media platforms can influence both the perception of the destination and tourists' intention to visit (Qiu et al., 2024). By analyzing social media trends and online travel reviews, tourism boards can anticipate demand patterns and adapt their strategies accordingly.

Finally, the collaboration between the film industry and tourism sector presents significant opportunities for mutually beneficial partnerships. Local tourism boards can engage with producers, writers and cultural institutions to create film-linked promotional campaigns, exhibitions and themed cultural festivals. These initiatives not only enhance destination branding but also contribute to the preservation and valorization of cultural heritage.

By addressing these managerial considerations, destination stakeholders can maximize the long-term sustainability of film-induced tourism, ensuring that visitor engagement is emotionally meaningful, economically beneficial and culturally respectful.

Originality of the paper. *This work in progress research makes a unique contribution to the field of film-induced tourism by integrating behavioral psychology and destination marketing to examine the impact of "My Brilliant Friend" on tourists' perceptions and travel intentions. Unlike previous research that primarily focuses on destination image formation through film, this work extends the discussion by incorporating constructs such as nostalgia and authenticity-seeking behavior, providing a more nuanced understanding of tourists' emotional engagement with cinematic representations (Kim et al., 2019; Lee et al., 2020).*

A key element of originality lies in the application of an extended model of the TPB to analyze how media exposure influences tourists' decision-making processes (Ajzen, 1991).

By complementing TPB with additional psychological constructs, this study bridges the gap between media influence and consumer behavior, offering a broader theoretical perspective on film tourism (Quintal & Phau, 2015). The use of PLS-SEM also distinguishes this research, as it provides an advanced methodological approach to understanding complex relationships between tourist perceptions, emotions and behavioral intentions (Hair et al., 2014).

Furthermore, the study offers a critical reflection on the risks of over-commercializing film-induced tourism destinations. While previous studies have emphasized the positive economic impact of media-driven tourism, this research highlights the potential drawbacks of artificial destination marketing, which can create unrealistic visitor expectations and lead to dissatisfaction (Karpovich, 2010).

By addressing the balance between media representation and authenticity, the study contributes to a more sustainable approach to film tourism development.

Another innovative aspect is the focus on digital communities. By analyzing how online fan groups engage with the series and share information about Naples, this study underscores the importance of virtual networks in shaping destination perception (Eppler & Burkhard, 2007; Pan et al., 2021).

Finally, this research advances the discussion on film-induced tourism by combining theoretical, methodological and managerial perspectives, offering insights that are both academically significant and practically relevant for destination marketers and tourism policymakers.

Key words: *Film-induced tourism; Theory of Planned Behavior; Authenticity; Nostalgia; PLS-SEM.*

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Virtual Reality and Tourism: A Literature Review

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Abstract

The virtual reality (VR) technology represents a recent innovation in the tourism field and scholars already highlighted it may have a notable impact on the future of the tourism industry (Tussyadiah et al., 2018). Despite an increasing interest in terms of publications, literature on the applications of VR in tourism appears still fragmented.
To address this issue and identify relevant research themes, this paper carries out a systematic literature review to order and synthesize existing contributions on the theme. Based on the PRISMA approach, a sample of 43 articles (published from 2004 onwards) was identified and organized into five possible clusters: Virtual Reality & Tourism Experience; Cultural Heritage & Virtual Tourism; VR Marketing & Consumer Behavior; VR Adoption & Technological Challenges; Emerging Technological Trends in VR for Tourism. Based on the review, the paper also provides some theoretical and managerial implications.

Framing of the research. *The rapid development of technologies has increased scholars' interest in Virtual Reality (VR), defined as the use of a computer-generated three-dimensional virtual environment to recreate real spaces (Guttentag, 2010). Indeed, some authors (Moro et al., 2019) already pointed out the growing number of published studies on this topic. However, the interest toward this technology also draws the attention of managers, companies, consumers and policymakers, thanks to its capacity to virtually recreate real objects, enabling users to immerse in artificial environments (Yung & Khoo-Lattimore, 2019).*

Compared to other technologies, VR may enhance the sense of presence and the degree of immersion in tourism sites (Bogicevic et al., 2019), and it is also economically, socially and sustainable (Sharma et al., 2024). These advantages induced researchers to investigate the possibility that VR could replace or complement tourism, becoming a sustainable substitute for visiting cultural and tourism sites (Sharma et al., 2024). The Covid-19 pandemic influenced the adoption and use of VR in tourism: specifically, in times of crisis, new technologies create opportunities to develop new markets (Shen et al., 2023), and the social distancing norms enabled VR to become quickly perceived as a substitute for travelling (Sarkady et al., 2020). The increasing interest in VR depends also on the fact that it is considered as an effective marketing tool which provides immersive experience and evokes emotions (Kieanwatana & Vongvit, 2024). Furthermore, within the virtual experience, this technology contributes to generating imagination, memory and attachment (Ji et al. 2023). Recent reports affirm that VR's industry, specifically the consumer VR market, is going to reach 18 billion U.S. dollars in 2025 (Statista, 2024), which could highlight the potential (but crucial) role of this technologies for the tourism market. To further confirm the growth of this technology, Statista (2025) foresees that the global extended reality market, which includes also VR, will reach 41.8 billion U.S. dollars in 2028.

While VR has been widely studied (Korkut & Surer, 2023), the existing literature appears quite fragmented (Bretos et al., 2024) and needs to be organized to understand the direction in which this argument evolves. Furthermore, literature on the theme is growing, not only in terms of interest, but also in terms of numbers, and literature review efforts may help scholars and practitioners to summarize extant knowledge on the topic. Cultural tourism, as a branch of tourism, may be particularly affected by VR. Moro et al. (2019) studied the developments of extended realities in tourism field from 2000 to 2018, finding the word "Cultural" 269 times in their review, with an increasing trend in terms of number of publications in last years - a trend also confirmed by Wei (2019). In addition, several scholars (for instance, Jung & tom Dieck, 2017) report that the use of VR in cultural tourism may support the co-creation of value for the tourism industry.

Purpose of the paper. *Research on virtual tourism has grown in recent years, due to increasing attention that scholars devoted to this theme (Moro et al., 2019; Wei, 2019). However, to date the existing literature on this topic is quite fragmented, probably due to the fact that the novelty of the research area determines rapid advancements. To help scholars fill this gap, the present paper offers a preliminary overview of current knowledge on VR in cultural tourism, trying to examine the main developments in this research area.*

By analyzing the existing literature, this paper aims to review the existing literature about virtual tourism (with a particular focus on cultural tourism), offering a theoretical and practical guide on this topic for scholars and

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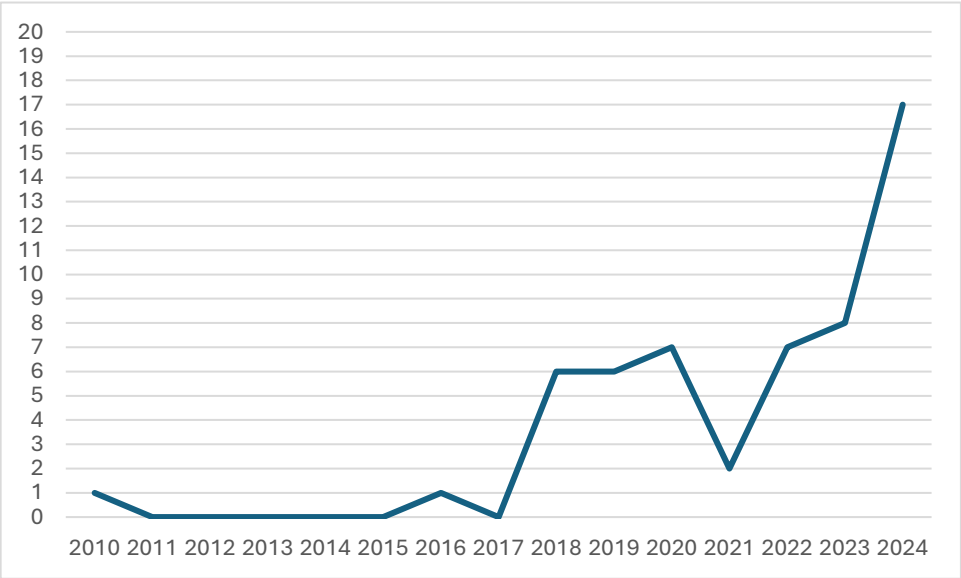
companies. Furthermore, the present study attempts to provide a preliminary guide to summarize current knowledge on the argument, offering a scheme which identifies five groups (clusters) of contributions. Finally, the paper proposes insights for future research, and theoretical and managerial implications.

Methodology. *For this study, a semi-systematic literature review was conducted to identify relevant themes and propose an overview of the extant research on VR and tourism (cf. Snyder, 2019). The article search was conducted based on the PRISMA approach (Moher et al., 2015). Articles were searched through Google Scholar, identifying peer-reviewed manuscripts published from 2004 onwards, using the keyword "tourism" and the term "Virtual Reality" in the article title. We considered articles published in journals that had the words "Management", "Culture", "Marketing" or "Tourism" in their titles. In this way, an initial sample of 201 papers were selected: respectively, 7 records were identified in Journals that had "Culture" in the title, 100 in Journals with the term "Tourism", 33 in "Marketing" Journals, 61 in "Management" Journals. Then, we screened the number of selected papers using inclusion and exclusion criteria: we considered only journals edited by well-known international publishers (i.e., Elsevier, Emerald, Taylor&Francis, Wiley, Sage, Springer), and book chapters and conference proceedings were excluded from the sample. Then, after reading the titles and abstracts, we excluded articles that didn't deal with the purpose of the research. Finally, we checked the presence of duplicates articles. The final sample was composed of 43 articles. A cross-validation of the search results using a different database (i.e., Web of Science) did not point out relevant differences.*

The time distribution of the articles is displayed in Figure 1.

Fig. 1: Time distribution of the identified articles



Results. *A thematic analysis (based on the articles' keywords) was conducted in order to identify possible literature clusters. This grouping procedure allowed to put together articles with similar or common themes related to the virtual reality domain. In this way, 5 different clusters were identified.*

1) The first cluster has been labeled "Virtual Reality & Tourism Experience" and includes articles dealing with the role of VR in shaping tourism experiences, including engagement, satisfaction and marketing applications. In this group, Wei et al. (2023) analyzed the role of gamification on fatigue and satisfaction, showing that gamification experience had a significant effect on tourism fatigue and satisfaction. Furthermore, they revealed that tourist satisfaction was significantly affected by several aspects of gamification (i.e., challenge, feedback, reward, and leaderboard). Yuan & Hong (2024), instead, examined the relationship between VR presence, VR enjoyment, flow, and how these elements impact the behavioral intention and the tourism experience. Results show that there was a positive relationship between VR presence and flow, that tourism experience and VR enjoyment were positively affected by VR presence, and that tourism experience had a positive effect on travel intention and recommendation intention. Kim and Hall (2019) sought to understand the effect of consumers' hedonics behaviors on continued use of information technology, analyzing the relationship between perceived easiness, perceived usefulness, perceived enjoyment, flow state and subjective well-being. Moreover, the authors added the moderating role of visit and non-visit groups to the destination shown in VR. Results revealed significant relationships between usefulness and flow state and between perceived enjoyment and flow state. Furthermore, continued use and subjective well-being were impacted by flow state, with subjective well-being influencing continued use. Finally, Sharma et al. (2024) conducted a quasi-experimental study to understand how and whether VR tourism may be the virtual and sustainable substitute of physical tourism. Results showed that technology embodiment (the capability to enhance user immersion by synchronizing real and virtual actions) positively influences authenticity, with these 2 variables positively impacting satisfaction.

2) The second cluster (labeled "Cultural Heritage & Virtual Tourism") is composed of articles investigating how VR is applied to cultural heritage sites and how it may enhance visitors' connection to historical and cultural heritage. Pantelidis et al. (2024) employed a mixed-methods approach to explore how VR experiences can strengthen tourists' place attachment in rural destinations. Findings show that the overall aesthetic experience of the site in VR had the biggest effect on the feeling of presence and the destination accessibility. This last variable influenced memories and presence, which in turn impacted loyalty. Atzeni et al. (2022) investigated the role of object-based authenticity and existential authenticity in non-immersive virtual heritage tour. The study suggested that both existential and object-based authenticity influence visitors' affective response to the experience. Furthermore, the study reports that cognitive response has a fundamental role in influencing visitors' emotional response, attachment to VR, satisfaction and intention to visit the site. Guttentag (2010) conducted a conceptual analysis to examine the potential impact of VR across six key areas in tourism: planning and management, marketing, entertainment, education, accessibility, and heritage preservation. The author highlighted several advantages of VR, particularly its virtual "nature", which enhances accessibility for individuals with disabilities and enables virtual visits to remote or otherwise inaccessible sites. VR was also identified as a valuable tool for heritage preservation and promotion, for inspiring real visits through virtual previews, and for education, offering immersive and information-rich environments. Lastly, Gao et al. (2022) explored the perception of authenticity of VR tourism, defined as an emotional and unique experience, proposing a theoretical framework. The framework shows that, after an inductive and deductive data analysis, 3 main themes resulted: objective authenticity, postmodernist authenticity and existential authenticity. For each main theme different kinds of VR are preferred; for objective authenticity, holographic photography VR is preferred, for postmodernist authenticity, computer-generated 3D environment VR is preferred and for existential authenticity, both holographic photography and computer-generated environment are important.

3) The third cluster (labeled "VR Marketing & Consumer Behavior") focuses on how VR is used in tourism marketing and consumer engagement strategies. Kostyk et al. (2024) investigated the mechanism of memory in consumer-brand experiences. The experiment was articulated into two moments (T1 and T2). During T1 participants were asked to experience the VR tour and to respond to a questionnaire, in T2, instead, after 3 weeks, participants were subjected to the same questionnaire. Through three studies the authors showed that episodic memory accuracy is lower at T2 than T1, semantic memory accuracy had no differences between the 2 periods and the name of the brand was remembered by 63% of T1 participants and became higher in T2 with 82% of respondents. Study 2 revealed that participants didn't feel cybersickness during the experience. Moreover, they had more accurate episodic memories at T1. Real-life users were more confident at T1, but in T2, VR users became more confident than others. To describe de experience, the words "nice", "fun", "interesting", "enriching", "impressive" were used. The study also showed that there was similarity between real-life experience and VR experience, and that the level of interactivity influences the ability to recall episodes experienced during the VR tour. Tussyadiah et al. (2018) aimed to understand whether the sense of presence may have consequences or effects on post-VR attitude change toward the destination and intention to visit. The study revealed a significant positive effect of the sense of presence on enjoyment, which in turn has, together with presence, positive effects on attitude change. Moreover, visit intention is impacted by attitude change. Bretos et al. (2024) conducted a comparative literature review to understand how scholars distinguished the role and the use of VR and AR. A conceptual framework that synthesizes variables from both technologies was built. The articles were classified into six contexts (destination, memory tourism, hotel, museum, theme park and tourism), with the authors noticing a development in recent years regarding methodologies and theories used. Qualitative methods and conceptual papers are mostly used for AR, and quantitative ones are more frequent for VR. Therefore, the study proposes an agenda for future research in order to guide the development of VR and AR research in tourism. Similarly, Beck et al. (2019) conducted a literature review, outlining the state of the art of VR research in tourism, classifying the outcomes in 3 levels of technology immersion: i) non-immersive, defined as "displays synthetic or 360-degree real-life captured content on a conventional (computer) screen" (Beck et al., 2019, p. 592); ii) semi-immersive, similar to the non-immersive, it has the possibility to project onto large screen monitor; iii) fully-immersive VR that completely isolates the user from the real life.

4) The fourth cluster ("VR Adoption & Technological Challenges") examines barriers to VR adoption, resistance and behavioral factors influencing VR acceptance. Shen et al. (2022) attempted to understand which are these factors and how much they influence the acceptance of AR and VR, investigating the relationship between perceived usefulness, perceived ease-of-use, hedonic motivation (which is related to enjoyment and playfulness), perceived price value and behavioral intention of using VR/AR for learning aims. Results show that perceived usefulness is positively associated with student's attitude toward virtual learning, which in turn is positively related to hedonic motivation. Moreover, a positive relationship between perceived price value and student's attitude was found. Students' behavioral intention to use AR/VR in education is positively influenced by their attitude towards the use of digital learning environments. Cham et al. (2024) examined the impact of barriers in senior tourists' (55 years and above) resistance, defined as the incapacity to acknowledge the values of innovation, and skepticism to use VR in tourism. Moreover, they attempted to understand if resistance and skepticism might influence the users' non-adoption intention. Technical barriers (perceived risk, defined as the uncertainties associated with the use of VR (Coldham & Cook, 2017), perceived complexity which is the perceived difficulties to adopt and comprehend VR, perceived incompatibility that is the discrepancy between VR benefits and the users' expectations) and psychological barriers (technological anxiety

understood as the sense of worry using VR technology, inertia is defined as senior tourists' tendency to undertake substantial efforts to keep the status quo of the existing decision and lifestyle (Cimperman et al., 2016), lack of human interaction) were considered. Results show that perceived risk, perceived incompatibility, technological anxiety, inertia and lack of human interaction are positively associated with resistance and skepticism. Resistance and skepticism to use VR in tourism lead to the non-adoption. Elkhwesky et al. (2024), instead, analyzed users' intention to use VR in tourism and the possibility to pay for electronic word-of-mouth of Gen-Y (users aged between 28 and 41) and Gen-Z (aged between 17 and 27) from Egypt in relation to travel fear for wars, pandemics and terrorism, environmental impact of tourism and technology anxiety. The mediating role of venturesomeness, defined as the willingness to try something new, was also studied. Results revealed that users' travel fear, environmental impact of tourism positively impact intention to use VR in tourism. On the other hand, technological anxiety influenced negatively the intention to use VR in tourism. Moreover, consumers' intention to use VR in tourism has a significant and positive impact both on the willingness to pay a premium price, and on electronic word-of-mouth. Finally, the moderating effect of consumers' venturesomeness doesn't impact on the intention to use VR in tourism. Zhu et al. (2024) examined the willingness to adopt VR tourism in terms of richness of quantity (multiple vs. fewer) and dynamics (dynamic vs. static) of virtual social cues, through the analysis of the relationships among interactivity, vividness, parasocial interaction, mental imagery. Furthermore, imagination (high vs. low) was used as moderating variable. Results show that mental imagery is significantly impacted by virtual social cues. Regarding the different scenarios, the second (with multiple virtual social cues) (vs. first; with few virtual social cues) shows stronger mental imagery, which in turn is even stronger in the third (dynamic virtual social cue) scenario. The second scenario had strong vitality and parasocial interaction. Static virtual social cues had less interactive and parasocial interactions, so the dynamic had more interactivity and parasocial interactions.

5) Finally, the last cluster ("Emerging Technological Trends in VR for Tourism") is composed of studies on future tourism technologies and emerging trends like Metaverse, augmented reality (AR), which, using computer-generated images, enable users to facilitate real-world interactions (Soltani Nejad et al., 2022) and mixed reality. Fan et al. (2022) constructed a meta-analytic framework to understand the core characteristics of AR/VR in tourism, the moderating variables that may influence the operating mechanism of AR/VR tourism applications and tourists' responses based on the core variables. Results show that presence, understood as the set of immersion, telepresence, interactivity, vividness, leads to behavioral intention, attachment, flow, affective engagement, satisfaction and positive attitude toward destination. Moreover, presence positively influences perceived ease of use and perceived enjoyment. About simulation type, presentation mode turned out to be better than 360-degree videos. Prior visitation has a negative impact on AR/VR in tourism. Social interaction influences positively AR/VR in tourism. Experience type has no significant effect on AR/VR in tourism. Bec et al. (2021) considered second chance tourism, a new approach that gives a "second life" to tourism and destinations, attractions and sites. The authors sought to explore the efficacy of creating tourism experiences in destinations and sites that have succumbed to over-tourism, a phenomenon referred to destinations which have excessive flows of tourists and that can bring negative effects. To this purpose, the paper explains the importance of virtual and mixed reality to preserve heritage. Nam et al. (2024), instead, investigated the mediating role of utilitarian, understood as usefulness of information and, hedonic aspects, understood as enjoyment, on satisfaction with VR, which, according to the authors, is the key for metaverse technology. The authors found that system quality, which refers to the ease of use of a system, and authenticity are positively associated with both enjoyment and usefulness of information, moreover, presence is positively associated with enjoyment, but not with usefulness of information. Results show that system quality and authenticity are positively associated with both enjoyment and usefulness of information, furthermore, presence is positively associated with enjoyment, but not with usefulness of information. Finally, enjoyment and usefulness of information are positively associated with satisfaction. Lastly, Zhu et al. (2023) investigated the impact of mental imagery on tourist telepresence, and satisfaction and the effect of VR vividness on tourist telepresence and satisfaction. Results showed that mental imagery positively predicts tourist telepresence and satisfaction; and that vividness positively predicts tourist telepresence and satisfaction. Telepresence positively predicts tourist satisfaction, which, in turn, positively predicts visit intention. The authors used for their study a non-immersive experience, considered part of the metaverse technology capable of affecting tourism visit intention.

Research limitations. *This work presents some limits. Some limitations are related to the research process: based on the adopted exclusion and inclusion criteria, we only included English article published by well-known publishers; moreover, we conducted the research using only Google Scholar and a limited set of keywords in the article title. Furthermore, another limitation may be that we selected articles considering a limited set of Journals in the management and tourism area.*

Theoretical and managerial implications. *From a theoretical perspective, this paper contributes to the literature by providing a summary of the current study of this technology in tourism. Furthermore, it offers a less fragmented overview of the research field, attempting to support future researchers in gaining an outline and expand existing theories in cultural tourism field, consumer behavior and technology adoption.*

From a practical point of view, this work offers marketers insights into VR tourism experience and its facets. Among others, it underscores the role and the influence of this experience on tourists (Wei et al., 2023), and, more important, the possible use of VR tourism as a virtual and sustainable substitute of physical tourism (Sharma et al., 2024). As

highlighted by Fan et al. (2022), extended realities may be a substitute, or may enrich the touristic experience, becoming tools to attract new target, and increasing the visit intention also in metaverse environments.

The review also suggests that the adoption of VR in cultural tourism may be used as a marketing tool in pre-purchase phase, to influence the visit intention (Bec et al., 2021), purchase phase, enhancing customer experience (Kim & Hall, 2019), and in the post-purchase to recall memories (Kostyk et al., 2024). Moreover, managers may consider extant literature to obtain an overview of technological challenges and how VR adoption can be enhanced (for instance, Shen et al. 2022, investigated factors that influence the acceptance of VR).

Originality of the paper. *In attempting to summarize extant literature on VR and tourism, this paper offers a preliminary (but practical) guide for scholars and managers. By identifying five possible literature clusters ("Virtual Reality & Tourism Experiences"; "Cultural Heritage & Virtual Tourism"; VR Marketing & Consumer Behavior"; "VR Adoption & Technological Challenges"; "Emerging Technological Trends in VR for Tourism") the paper offers a useful tool to understand in which way the research on the topic is advancing.*

Keywords: *Virtual reality; tourism experience; cultural heritage; virtual tourism; tourism marketing; tourism management.*

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Lean Six Sigma for a Sustainable Customer-Driven Procurement Model in Tourism: A Case Study Analysis

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Abstract

This paper investigates the managerial and economic sustainable implementation of the Lean Six Sigma (LSS) framework within the tourism industry. LSS is a strategy that merges Lean principles with Six Sigma methodologies, specifically aimed at boosting operational efficiency and enhancing customer satisfaction. The voice of the customer elevates the consumer to a key player who initiates the demand in which the LSS framework helps facilitate sustainable supplier relationships in booking service agencies. A qualitative approach focused on the Golden Moments Worldwide Ltd. case study has been applied. This digital platform facilitates experience-driven tourism booking services within the Italian market analysis. This is backed by the theoretical framework of previous studies closely related to the model created in this paper to enhance the current operational approach further. This study presents a new structured model based on observations for businesses aiming to improve customer experiences while enhancing operational efficiency and managerial sustainability through a new model-driven decision-making. The insights obtained aim to contribute to academic literature and influence industry practices, underscoring the importance of LSS beyond traditional sectors and setting the stage for future research on sustainable human-centered and customer-focused service optimization in tourism.

Key words: *Tourism Management; Lean Six Sigma; Lean Management; Customer Centricity, Sustainable Service Procurement; Sustainable management approach.*

Framing of the research. *Krafcik (1988) initially introduced the Lean Production (LP) philosophy, which was later popularized by Womack et al. (1990). Drawing its routes within the Toyota Production System (TPS). Lean aims to eliminate non-value-adding activities and enhance process efficiency through structured waste reduction techniques (Ohno, 1988; Spear & Bowen, 1999). Lean achieves this through its value stream mapping, flow, pull, perfection, and value and is used to minimize waste and reduce bottlenecks aimed at increasing the efficiency and creating higher value for consumers and suppliers (Womack & Jones, 2003). Bill Smith developed a methodology that could complement these principles. In the mid-1980s, Motorola developed Six Sigma, a data-driven approach to reduce process variation and defects (Pyzdek & Keller, 2014). Six Sigma is grounded in this statistical analysis of processes through the DMAIC framework (Define, Measure, Analyze, Improve, Control) using statistical tools like capability analysis, control charts, and root cause analysis to drive improvements (Pyzdek & Keller, 2014). These methodologies combined to create Lean Six Sigma (LSS). Integrating lean and Six Sigma aspects. Lean aims to generate operational efficiency, while Six Sigma uses a statistical backbone to operationalize and improve organizational performance (Snee, 2010; Pepper & Spedding, 2010).*

With the original application in mind for both Lean and Six Sigma principles, there has been noticeable expansion outside the manufacturing domain, with these principles progressively becoming a more integrated part of service industries (Lancaster, 2011; Andrés-López et al., 2015), including healthcare, finance, and education. One of the fields that has emerged is tourism, which is where our focus lies. A viable sector for LSS integration due to the increased complexity of customer-driven approaches and service dynamics (Foris et al., 2020; Almomani et al., 2023; Avalos-Rolando et al., 2022). The LSS Management approach aims to support demand-driven logistics, customer customization, and flexible resource allocation. Key indicators that increasingly characterise the tourism industry. These principles could provide the competitive edge required in the increasingly entangled global tourism landscape (Bhuiyan & Wahab, 2018; Perdomo-Verdecia et al., 2022). The tourism ecosystem is increasingly under pressure to improve service quality, reduce waste, and ensure sustainability (Tatiyanatakul & Chindaprasert, 2024). LSS can position itself as the promising solution. The tools used by LSS, such as Just-in-Time (Otamendi, 2011), Kaizen (Waaje, 2025), and Poka-Yoka, can be used to prevent errors and align services with dynamic customer expectations if appropriately integrated.

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Despite the potential and growth in interest, the integration of Lean Six Sigma in tourism remains limited and fragmented. The focus is often allocated to destination management (Foris et al., 2020) or high-level strategic planning (Zhang et al., 2009). There is a gap in the empirical studies that analyze the implementation of LSS in booking service agencies. Integration within procurement, customer personalization, and service curation is exceptionally scarce. At the same time, authors such as Khalaf (2024) and Mesut Ülen (2020) have discussed LSS strategies in the context of tourism service settings. Their insights are often connected to the potential application of LSS tools within the broader business model, with a clear gap in customer-oriented procurement, especially within the travel and booking agency sector. This academic gap presents the need to understand how LSS tools can be systematically and sustainably applied in tourism service procurement and customer-centered model design. This research path is reinforced by the relevant benefits that LSS could provide. Presenting the capacity to shift from a traditional supply-led structure to customer-pull models that enhance customization, reduce service lead times, and build agile supplier networks (Jones & Womack, 2003; Avalos-Rolando et al., 2022).

This paper aims to respond to the existing gap by doing an operational analysis of the application of LSS in a tourism booking agency. Golden Moments Worldwide LTD is in the process of integrating these methodologies within its Italian market for operational testing of the new management approach. The research explores how LSS tools such as DMAIC, Just-in-Time, and kaizen are used. Operationalising continuous improvement cycles that aim to support the transition from a rigid, supplier-centric procurement model to a flexible, customer-driven one. By analysing Lean and Six Sigma principles academically and in practice, the study aims to contribute to academic literature and tourism management practice.

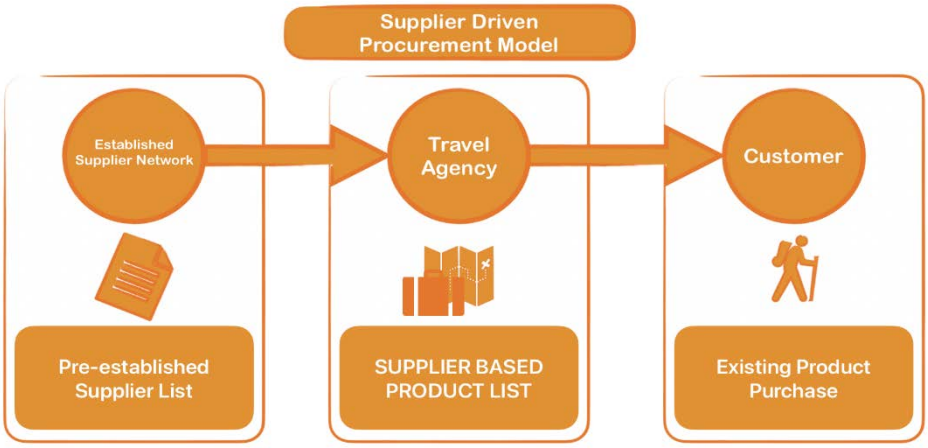
Purpose of the paper. *This paper focuses on developing and analyzing the LSS application in an empirical business context. This management method has found a broad and constant development of interest in the scientific literature and has seen several applications in various industrial sectors, with recent wider adoption in the service sectors, and limited application within the tourism sector. This paper aims to develop an LSS customer-driven procurement model to address the limited empirical research within tourism procurement. The goal is to assess how LSS can support operational sustainability, customer-centric design, and decision-making through the analysis and observations of the Italian market branch of our case study. The case study will be centered around Golden Moments and its integration process of LSS tools and principles to observe if these tools can be sustainably implemented to shift from supply-led to demand-driven procurement. This study aims to propose a replicable model linking the empirical and theoretical findings of LSS to customer-led service innovation. This research seeks to understand if the LSS approach can be adequately applied in tourism, particularly for tourism booking agencies, with an extra lens on managerial transformation. The integration process of Golden Moments Worldwide Ltd's Italian market has been crucial to explore the possibilities within LSS, outlining the structure of the model, and understanding the operational-managerial approach. This analysis finally aims to develop a sustainable procurement model capable of presenting the incidence occurring on the operational and management processes when lean management thinking is applied for the acquisition and booking of tourist services.*

Methodology. *This research employed qualitative methods at various stages, including interpretation from internal observation, semi-structured interviews, and analysis of the operational processes of the case study over time, supplementing significant desk research. The semi-structured interviews are being conducted with Golden Moments' CEO and co-founder, Steven Cheatle. He played a critical role in enabling the implementation of LSS in the Italian market. The first interview has been conducted once so far, with planned interviews along the way, which aim to involve other market managers, as GM is in the process of integrating the LSS tools further. Internal observation of the head of the Italian market, Raffaele Tardio, led to a detailed qualitative analysis of observed operational and managerial shifts. These participatory observations enabled the empirical study of operational changes as LSS tools are progressively introduced. Golden Moments operates in 14 European countries as a booking agency. The Italian market is the most active and requires an operational shift to align with the highly variable customer expectations and demand. Its goal is always to exceed customer expectations. Driven by innovation, GM aimed to develop a model that could operate sustainably in the tourism industry. Therefore, this case study has provided the basis for operational observations and implementation of theoretical desk research, which helped formulate the model proposed in the paper.*

Based on these operational observations and desk research, a structured model has been created. As a work in progress that aims to develop in the future, the research path will also move on by collecting quantitative data and submitting questionnaires to Golden Moments employees. The data is still being developed, and the model is currently based on internal participatory observations, as mentioned before, and is therefore exploratory. These research methods were employed to bridge the aforementioned gap of limited application of procurement models linked to the LSS side of the operations.

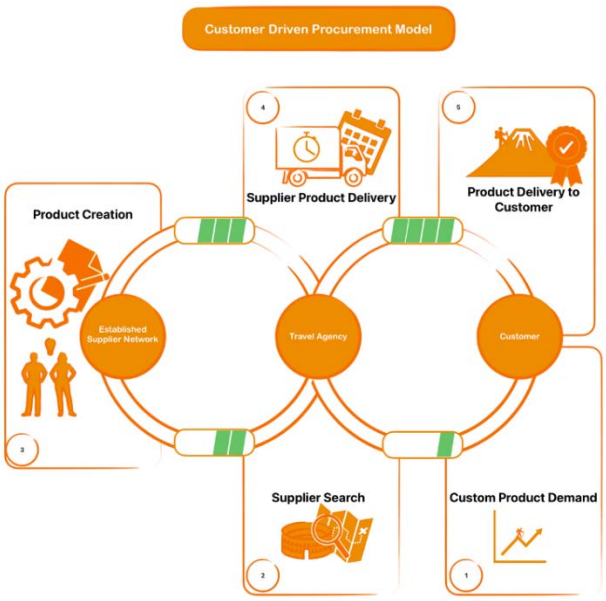
Results. *The non-LSS supplier-driven procurement model operated on the following methodology. The supplier network consisted of an established network that generated submissions of supplied experiences curated to be displayed on the website. These Partnerships were formally solidified through contracts. These contracts formed the basis of the company's offering. These experiences were given as a pre-set product list from which customers could purchase their experiences. This operational approach revealed several inefficiencies prioritizing supply-side stability over demand-side responsiveness. This model resulted in a rigid service structure that showed its inflexibility. The agency's role was limited to operating as an administrative intermediary, not a strategic key stakeholder within the procurement process. This inflexibility was further noted in the static relations. This leads to limited real-time customization or client input. Experiences became outdated or were misaligned with suppliers' or customers' preferences.*

Fig: I: Old Procurement model



The new procurement model presented in the figure below and suggested in the paper has been developed based on internal observations of the operational integration process of LSS. While not fully integrated and operationalized, management has seen a significant shift to a managerially sustainable and customer-driven approach. The customer is the key player who initiates the demand. This initiation set the procurement process in motion. The agent is the key operator of that process. The agent aligns the optimal supplier for the consumer with the given budget and timing to meet the customer's needs. Once aligned with the most optimal supplier on the service concept, it can then be curated through the agency's intermediation between the supplier and the consumer. It is handed to the supplier to create the service in demand. The Supplier provides the necessary information to the agency, which, as an intermediary, finalizes the service to deliver to the customer for their experience. This experience can be added to the catalog for future sales and reference.

Figure II: New Procurement Model



The upper figure (Figure II) shows the new procurement model, which emphasizes a shift from a supplier-driven procurement model to a customer-driven approach. The change in approach aims to shift from a push to a pull methodology, working towards achieving a lean-oriented approach (Jones, 2003). The original procurement method relied on an established network of suppliers who provided pre-determined services under rigid contracts. This meant there was a prioritization of inventory availability over customization, limiting the flexibility and responsiveness of the booking service agency. Such an inflexible approach potentially hinders long-term, sustainable service creation and procurement.

The new customer-driven procurement model operates on demand-driven principles. Customers initiate requests, prompting the agency to search for suppliers who meet their requirements (S. Cheatle, 2025). The consumer becomes a Prosumer who actively shapes the service through engaging in a co-designed experience and using feedback aimed at

enhancing the created value for the customer. This transformation of the consumer to a prosumer reinforces and aligns with lean principles. Removing bottlenecks (Flow), eliminating inactive suppliers, acting only on demand, improving resource allocation (Waste Elimination), and increasing customer value creation as the experience is tailored to their needs (Womack & Jones, 2003). Feedback loops and service personalization enhance responsiveness, reduce resource waste, and allow the agency to develop dynamic supplier relations that support long-term trust and adaptability (Niezgoda, 2013). The move from fixed contracts toward a flexible, on-demand supplier base. Aimed at fostering dynamic partnerships and enhancing adaptability. This approach encourages a fluid relationship that bolsters trust and long-term value creation for all parties aiming to develop a sustainable supplier network from a managerial and economic perspective.

Six Sigma tools, such as the DMAIC framework (Define, Measure, Analyze, Improve, Control), have operated as a key guide to process redesign. Golden Moments is in the middle of operationalizing and further enhancing the process. Having defined the problems during the Define phase, identified the process rigidity and low customization rates as key problems, the current measure phase is in progress. With the restructuring of supplier onboarding, selection optimization, and error reduction strategies being implemented during these phases, we expect to see the optimization of procurement accuracy by aiming to minimize defects and improve supplier performance (Pyzdek, 2014). The combination of both these methodologies ensures a seamless procurement process, enhancing service quality while maintaining sustainable operational efficiency.

Due to the shift to an LSS approach within Golden Moments, a transition can be noted from rigid supplier relations to agile procurement strategies that prioritize customer experience, drive long-term value creation, and continue developing long-term supplier relationships as long as each stakeholder gains an advantage by participating within the network. These developments helped us create the model framework that will be further enhanced, implemented, and tested within Golden Moments.

Table I: Golden Moments Model Comparison

Golden Moments	Old Model	New Model
Suppliers	Established Supplier Network	Flexible Supplier Network
	Potential Inactive Suppliers *(waste)*	Active On-demand Suppliers
Pricings	Rigid Pricing	Dynamic Budget Pricing
	Supplier Driven Pricing	Agency Driven Pricing
Product	Established Product List	Personalized Product On-Demand
Management	Product Oriented Management Approach *(Push)*	Customer Oriented Management Approach *(Pull)*
Tools	Pre-stock Control System	JIT, Poka Yoka, Kaizen
	Contract life cycle Orientated	DMAIC
Contract	✓	✗
Lean	✗	✓
Six Sigma	✗	✓
Pre-Set Product	✓	✗
Custom Product	✗	✓
Customer Satisfaction	✓	✓
Supplier Network	✓	✓
Dynamic Supplier	✗	✓
Avoid Waste	✗	✓
Dynamic pricing	✗	✓

Golden Moments relied on a network of suppliers contracted to deliver services. Usually, the supplier approached Golden Moments to be on the product list. This creates an established expectation of the benefits the service will provide to both parties. In practice, however, this has led to inactive suppliers who made contractual agreements binding them to deliver a service even when the demand was too low to justify the original deal. This unbalanced status between the stakeholders strains a potential relationship due to the clients' highly variable and flexible demand and the inflexible agreement.

The agreements ensured the service supply was stable, as this predetermined the packaged service on offer from Golden Moments, making it less flexible to changing consumer demands but guaranteeing supply. This guarantee was further reinforced by a rigid price the supplier set, as the agency had less bargaining power due to a lack of immediate consumer demand. This hindered potential sales of the agency, but in the future, it might hurt suppliers due to the low agreed sales prices that could not contractually react to extreme events like COVID-19.

The new flexible approach empowers both the consumer and the supplier. Customers initiate the demand, and suppliers respond on an on-demand basis. The consumer acts as a prosumer, integral to their experience. The agency dynamically selects the most suitable supplier on a case-by-case basis enabling enhanced matching and improved negotiation leverage based on active demand (Niezgoda, 2013). This structure establishes a win-win scenario, fostering trust, responsiveness, and sustainable supply management. By curating adaptable packages based on customer

parameters such as location, time, budget, and experience type (Weerakoon, 2023), the agency facilitates deeper information exchange and improved long-term supplier collaboration.

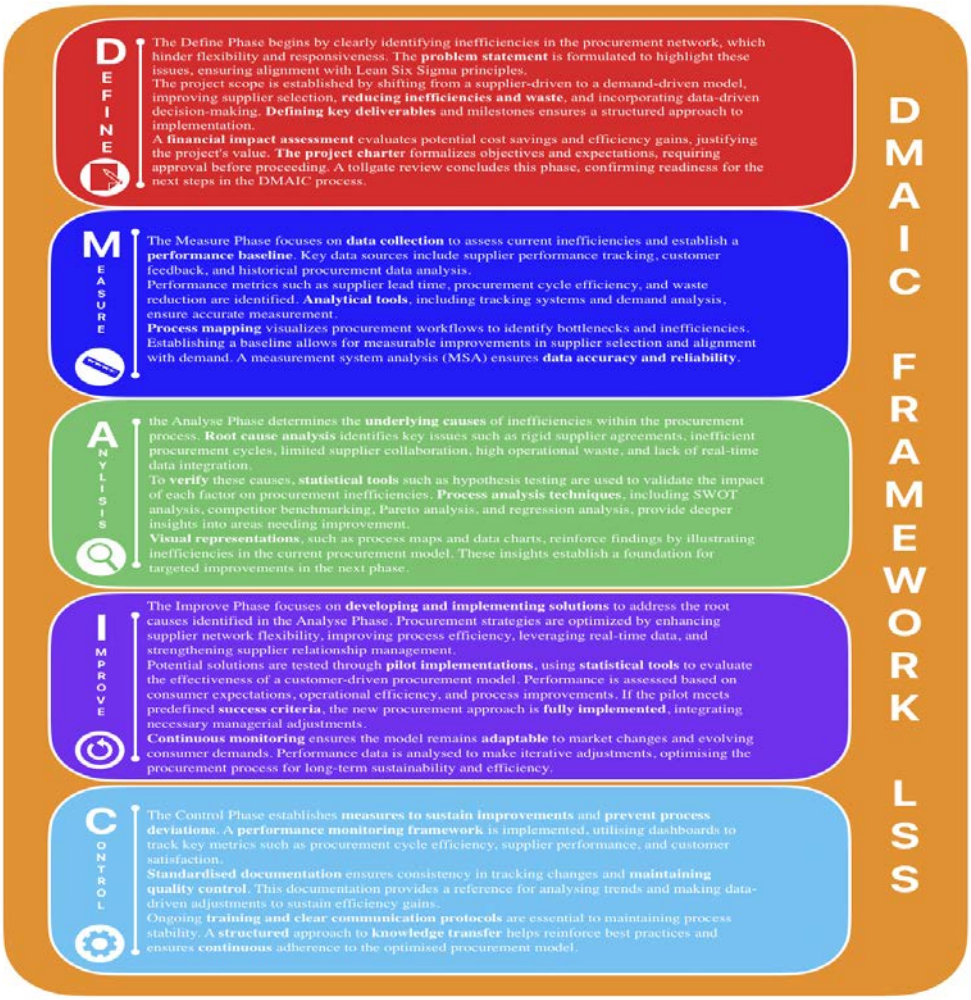
Golden Moments' operational management approach has shifted from service-oriented to customer-oriented. This change in approach focuses on a pull methodology instead of a push methodology. The strategic shift emphasizes customer value and engagement, prioritizing customer needs and creating collaborative value. This shift supports a sustainable relationship with suppliers and customers, and through active collaboration, a sustainable supply of custom products, where all parties will enter a win-win scenario. This can be facilitated through a digital platform, which Edvardsson and Tronvoll (2020) argue can facilitate stakeholder cooperation, where this new form of stakeholder interaction could occur.

The old system relied on a steady supply of experiences fostered through contracts, with offerings oriented around the contract's life cycle. A pre-stock control system approach ensured that there were always offerings on the website.

Golden Moments is in the process of integrating Lean and Six Sigma methodologies and aims to apply the model suggested within the paper to achieve the transition, optimizing its processes to deliver high-quality, sustainable, customizable products efficiently. The principles and tools further explored in this paper are as follows: Just-in-time (JIT) ensures that services and supplier engagement occur only when a customer initiates a request, reducing waste associated with inactive suppliers and excess inventory. Aligning supplier selection with immediate demand, the model aims to minimize unnecessary commitments and enhance operational flexibility (Otamendi, 2011). Poka-Yoka aims to use mistake-proofing mechanisms to prevent service execution errors. Supplier performance and customer experience inconsistencies will be reduced by embedding quality checks. The model seeks to ensure seamless and reliable service delivery (Waaje, 2025).

The culture of continuous improvement, known as Kaizen, is implemented within Golden Moments to foster adaptability and continuously improve its dynamic supplier network. The application of continuous improvement in the procurement model aims to allow Golden Moments to adapt dynamically to the customer-oriented demand and be flexible in its supplier network. It eliminates waste by continuously evaluating and testing its supplier network. It creates qualitative relations within its network of suppliers, shifting it towards optimal resource allocation to meet customers' expectations and operate sustainably, allowing the model to refine processes based on customer feedback data and evolving market conditions. This improvement model enhances efficiency and customer satisfaction (Waaje, 2025).

Figure III: DMAIC Procurement Model



The upper figure (Figure III) shows the potential implementation of DMAIC in the procurement model, enhancing projects. The framework helps set project guidelines and achievable, concrete goals for the team. Standardizing such projects helps management monitor progress. Enabling structured problem-solving and ensuring process optimization management through a data-driven approach, the framework aims to allow golden moments to enhance service accuracy, supplier performance, and long-term value creation on a customer-driven model that aims to achieve sustainable data-driven procurement (Pyzdek, 2014). Golden Moments seeks to foster a dynamic and efficient service ecosystem through these tools, reinforcing its commitment to customer-centric innovation, supplier collaboration, and operational excellence as it progresses through integrating the tools within the LSS toolbox. The model shows potential applications and future research based on the performance of the integration of LSS in the Golden Moments, a customer-oriented model.

Research limitations. *This qualitative study has potential limitations. This paper currently represents a work in progress whose result could be better supported and validated over time by collecting a wider range of quantitative data at Golden Moments Worldwide Ltd. Furthermore, the effect estimates in the model are based on interventional and prospective internal observational studies conducted by some of the writers. They are therefore subject to human biases and confounding that might have impacted the model setup and estimates. In addition to this, it would be interesting to evaluate how an increasingly conscious application of the proposed and now structured model for Golden Moments could eventually lead to further growth in the economic performance of the business in the years to come. Moreover, only the Italian market department has been considered in this study. So, in the future, it will be relevant to extend the analysis to all the European and global markets active within the business. Besides, to prove on a longer term the validity and effectiveness of the model obtained as a result of the analysis developed in this paper, it would be appropriate to verify how the application on other case studies of travel agencies and various tourism businesses can influence their economic sustainability and impact their profit performance over time. So, it is possible to consider this work as a step in a research path that is in progress and that can be further developed in the future.*

Managerial implications. *Considering tourism as an economic activity linked with services and the third sector, it can be concluded that it differs from other activities in terms of its specific elements, particular managerial dynamics, and the characteristics that compose the business field. This makes the sector, which operates and evolves on multiple levels and dimensions, a complex area to analyze and structure from a management perspective (Andjelic and Ilic 2022). The research results of this work and the analysis of the Golden Moments Worldwide Ltd case study lead to the expression of a transformation in the management of the company's operational processes. The result is the development of a new sustainable model, no longer driven primarily by the service supply chain, but mainly focused on constructing a service in line with customer demand and client needs. This new model is structured following the insertion and application of strong lean management thinking in the company's operational flow and some principles of the LSS method. The latest model proposes a standardized but, simultaneously, circular and multidirectional structure, which actively involves all stakeholders in creating and developing the tourism product that is finally delivered to the market. The new managerial perspective leads to the need for a fluid and non-static managerial approach that must consider the point of view of all the subjects involved in the process. Therefore, transitioning from a supply-oriented model to a customer-oriented model involves setting up a process management that is open to modifications, changes, and corrections in progress and ready to provide a rapid and just-in-time response to customer demand. Furthermore, the new model aims to keep the supply network active and manage dynamic relationships with suppliers and customers.*

Originality of the paper. *This paper investigates the potential impact of LSS in the tourism sector, an area that has been relatively underexplored compared to its traditional application in the manufacturing industry. The adaptation of LSS in tourism, particularly the transformation from a supplier-driven to a sustainable customer-driven business model, can significantly contribute to academic literature and industry practice, inspiring new avenues of research and practice. The study distinguishes itself by providing a lens into the practical application of the case-study-based analysis of Golden Moments Worldwide Ltd. It provides insights into how LSS tools can drive operational and managerial shifts in tourism service procurement and booking processes. The difference between this paper and previous studies is its shift in focus, which focuses on the theoretical applications of LSS. It integrates a real-world qualitative approach to assess how LSS principles reshape business workflows, stakeholder relations, and customer satisfaction through a managerial sustainable approach.*

This research paper looks into the potential application of Lean Six Sigma tools and creates a procurement model based on an analysis of Golden Moments' operations. It demonstrates a transition from a push-based supplier model to a pull-based customer-driven system, enhancing efficiency, flexibility, and long-term supplier relationships and voice of the customer. This case represents a significant transition from LSS's application beyond its conventional industrial domain. It offers actionable insights for other tourism businesses looking to improve service customization, reduce waste, and optimize operational decision-making with a sustainable management approach. So, customer demand information collection and the dynamic Golden Moments supplier network database help create an effective and sustainable new procurement flow for the firm. The digital communication process applied on the platform is also a key to obtaining sustainable and functional relationships between stakeholders.

By combining theoretical insights with a business case study, this paper extends the scope of LSS applications and provides a framework for future research and industry adoption. This marks a critical step in bringing management science and real-world tourism sector transformations and opens up exciting avenues for future research and industry adoption.

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Leveraging Visitor Satisfaction to Enhance cultural Sites Management: Fresh Insights from Bourbon Heritage

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Abstract

This study explores visitor satisfaction with regard to the Bourbon cultural heritage sites in Campania, adopting a mixed-methods approach to assess key dimensions of the visitor experience. Through preliminary interviews with site visitors, the research applies an expectancy-disconfirmation framework to analyze the relationship between perceived quality and importance attributed by audiences. Findings reveal significant appreciation for the cultural and historical value of the sites, while identifying critical gaps in infrastructure, digital accessibility, and post-visit engagement. In particular, mismatches between visitor expectations and actual service delivery emerge, especially in areas such as online communication and complementary services. Demographic and behavioral insights highlight a growing interest in thematic experiences and personalized itineraries, underlining the need for adaptive and visitor-centered management strategies. By integrating satisfaction metrics with site management considerations, this study contributes to the advancement of cultural tourism research and offers a foundation for future initiatives in destination management and sustainable cultural development in Southern Italy.

Framing of the research. *Tourism is one of the sectors that significantly contributes to a country's economic development, together with the many industries connected to it (Wang et al., 2017). Within this broader framework, cultural tourism represents a strategic pillar of the global tourism economy. In Southern Italy, Bourbon heritage sites represent an underexploited yet high-potential resource for cultural tourism enhancement. Despite their historical and cultural relevance, these sites remain marginal in traditional tourist itineraries, limiting their visibility and integration into wider heritage circuits. In this context, understanding visitor satisfaction emerges as a valuable tool for unlocking their potential. Rather than providing definitive answers, preliminary evidence from visitor experience analysis can reveal areas of strength and weakness, offering useful insights for shaping more effective local destination management strategies (Greco et al., 2024). In particular, the perceived quality of the visit-shaped by both the content offered and individual expectations-plays a crucial role in the overall experience. Adopting a visitor-centered approach to managing cultural heritage, even in its early stages, can serve as a lever for future planning aimed at more inclusive, engaging, and sustainable development of heritage-based tourism.*

Visitor Satisfaction in Cultural Heritage

A strategic emphasis on visitor satisfaction depends on the quality of interactions with cultural heritage (Fyall, Garrod, & Wang, 2012) and aligns with broader efforts to enhance the attractiveness and accessibility (Napolitano & Bifulco, 2024; Cerdan Chiscano & Jiménez-Zarco, 2021) of heritage sites, transforming them into pivotal elements of the cultural identity and tourism economy. The expectation-disconfirmation theory provides an effective theoretical framework for assessing visitor satisfaction by comparing pre-visit expectations with actual experiences (Clemons & Woodruff, 1992). Applied to cultural heritage sites, this approach links satisfaction to factors such as the quality of the attraction, its state of preservation, and its perceived cultural value (Huh, 2002). A key determinant of overall satisfaction is the quality of the visitor experience. In this regard, a study conducted in the historic center of Macau identified four primary dimensions - experiential quality, perceived value, heritage image, and satisfaction - which significantly influence tourists' behavioral intentions (Chen & Chen, 2010).

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Place attachment also plays a crucial role in fostering visitor satisfaction and encouraging sustainable tourism behavior. Buonincontri et al. (2017) developed a conceptual model integrating heritage experiences, emotional connections to the site, and sustainability, emphasizing how affective bonds can enhance the cultural value of heritage sites and encourage repeat visits. Similarly, Beeho and Prentice (1996) highlight the importance of understanding both the emotional and cognitive responses of visitors to develop customer-oriented marketing and planning strategies. In line with this perspective, De Rojas and Camarero (2007) propose a model that combines cognitive and affective approaches to satisfaction, underscoring the pivotal role of emotions in shaping visitor experiences.

Even if Nicolais (2023) has initiated research on enhancing Bourbon sites, with a particular focus on sustainability efforts at the Real Sito di Carditello, the current body of literature reveals a significant gap in the application of multidimensional visitor satisfaction assessments to Bourbon heritage sites, as well as in the evaluation of place attachment. This lack of empirical studies underscores the need for comprehensive analyses to fully understand the potential of these sites as cultural tourism destinations, facilitating the development of targeted and sustainable valorization strategies. Future investigations should prioritize tailored satisfaction assessments and foster collaboration with local stakeholders. Adopting a systematic strategy could strengthen the role of Bourbon heritage sites within Italy's cultural tourism sector, ensuring a balance between visitor experience and heritage conservation.

Grasping Perceived Quality and Attributed Importance to Inform Destination Management Strategies

Cultural tourist satisfaction is a multifaceted concept that goes beyond the perceived quality of the services provided. The literature emphasizes the importance of considering both the quality of services and the value attributed by visitors based on their individual priorities (Mariapina & Della Lucia, 2019). Some scholar identify key factors influencing overall satisfaction and confirm that it is shaped by a variety of service quality elements, each with varying degrees of relevance. Cultural experiences significantly impact satisfaction, as the perception of the quality of cultural services is crucial in determining tourist satisfaction levels. Furthermore, the cultural context and perceived authenticity play a significant role in overall satisfaction, as tourists are increasingly drawn to authentic and meaningful experiences (Domínguez-Quintero et al., 2020). The perceived quality of public cultural and tourism services positively affects the quality of life of visitors, highlighting how the importance attributed to these services plays a critical role in overall satisfaction. Additionally, the perception of safety during visits to cultural sites directly impacts satisfaction, as visitors value experiences that provide comfort and tranquility. The emotional impact of the experience plays a crucial role in tourist satisfaction. The competence of tour guides also significantly influences satisfaction, as visitors place great importance on the quality of interaction and the knowledge provided during the tour (Huang et al., 2010; Fyall et al., 2012; Kara et al., 2023; Karacaoğlu, 2024). To accurately assess cultural tourist satisfaction, it is essential to consider both the service quality and the importance of key aspects of the experience. This approach helps refine offerings, improve satisfaction, and encourage repeat visits. Analyzing service expectations and gaps can further enhance the design of the tourist experience.

Purpose of the paper. *The primary objective of this exploratory study is to examine emerging patterns from preliminary visitor experiences at Bourbon heritage sites in Naples, with the goal of informing local destination management strategies. By identifying key factors that influence visitor satisfaction, the study aims to provide insights into how addressing specific strengths and weaknesses-such as the appreciation of cultural content, infrastructural gaps, limited digital accessibility, and insufficient post-visit engagement-can improve the positioning of Bourbon heritage sites within a broader destination management framework. This research integrates visitor feedback with managerial implications, laying the groundwork for future projects focused on fostering sustainable, visitor-centered development in the context of local cultural tourism.*

RQ: "Which emerging patterns from preliminary visitor experiences at Bourbon heritage sites can inform local management approaches?"

Methodology. *This research focuses on prominent, historically authentic Bourbon heritage attractions located in Naples, selected for their cultural significance and potential to represent the broader network of Bourbon destinations in Campania. A qualitative approach was adopted to explore visitor satisfaction. Preliminary interviews were conducted with visitors on-site to gather insights into key dimensions of the visitor experience, using an expectancy-disconfirmation framework to compare perceived quality with the importance attributed to various service aspects. While these initial findings are not yet exhaustive, they offer valuable insights that can guide further, more structured investigations.*

This approach provides a structured framework to understand visitor expectations and identify areas for improvement in service delivery, aligning with previous studies that have explored Experiential Quality and its impact on engagement in cultural heritage (Chen and Chen, 2010; Buonincontri et al., 2017). The analysis considers both physical and digital aspects of the visitor journey, recognizing the growing role of digital engagement in shaping pre-visit expectations and post-visit experiences. Data were gathered using a Likert scale (ranging from 1 to 5), a standard tool in customer satisfaction studies, which allowed respondents to articulate their perceptions of quality and the significance of different aspects of their visits. This approach yields a comprehensive understanding of visitor experiences and their satisfaction levels.

This study adopts a qualitative perspective to assess visitor satisfaction at Bourbon heritage sites. This methodological framework combines structured surveys with an expectancy- disconfirmation model, which measures satisfaction by analyzing the gap between perceived quality and the importance attributed to various aspects of the visitor experience. By applying this approach, the study provides a comprehensive understanding of visitor expectations and areas requiring service improvements, aligning with existing research on experiential quality and cultural engagement, which enables a holistic analysis of both subjective and objective aspects of the visitor experience, providing valuable insights for improving service delivery and enhancing the overall visitor experience at Bourbon heritage sites.

Results. *By assessing visitor satisfaction at Bourbon heritage sites using the aforementioned methodological framework, the study revealed a series of key findings.*

Findings indicate that both sites are highly appreciated for their cultural offerings, such as exhibitions and artifacts, yet notable gaps exist in accessibility, supplementary services, and post-visit engagement. For what concerns the first site, online information availability and digital post-visit support receive lower satisfaction ratings compared to their perceived importance, suggesting the need for enhanced pre-visit communication and sustained interaction after the visit. Accessibility also presents a challenge, as it scores lower in perceived quality than in attributed importance, indicating that visitors expect a more seamless experience. Complementary services, including online booking and ticketing, receive mixed evaluations, reflecting the necessity of further optimization to improve ease of access.

Similarly, the second site demonstrates strong performance in core cultural experiences but faces significant shortcomings in digital engagement, which rank among the lowest-rated dimensions of visitor satisfaction. Additional services are particularly underwhelming, with a significant negative satisfaction index, highlighting the need for investment in visitor amenities.

The study also emphasizes the growing role of digital engagement in shaping both pre-visit expectations and post-visit experiences. Visitors increasingly rely on online information before their visit and expect continued interaction through digital platforms afterward. The analysis highlights that improving these aspects, along with accessibility and complementary services, will be essential for aligning visitor experiences with their expectations. Implementing targeted service enhancements, such as better online resources, expanded amenities, and interactive feedback mechanisms, could contribute to higher satisfaction levels, fostering repeat visits and reinforcing the long-term attractiveness of these cultural heritage sites. Moreover, strengthening digital post-visit engagement strategies could enhance visitor loyalty and encourage deeper interaction with the cultural institutions beyond the physical visit.

Implications. *By analyzing satisfaction-related dimensions across multiple aspects of the visitor experience, this exploratory study highlights key areas in need of targeted improvement-most notably, accessibility, online communication, and complementary services. These preliminary findings provide useful indications that can inform the design of future strategies in local destination management for cultural heritage.*

From a theoretical standpoint, the results reinforce the importance of deepening our understanding of visitor expectations and experiential dynamics within the context of heritage tourism. In particular, the data suggest a growing relevance of digital engagement and information accessibility, dimensions that may not yet be fully integrated into existing theoretical frameworks (Iodice & Bifulco, 2024; Chen & Chen, 2010). Furthermore, the study draws attention to the emotional dimension of the visitor experience, underscoring how affective connections to heritage sites contribute to overall satisfaction and future loyalty. Although prior research has emphasized immersive technologies as drivers of engagement, the current evidence suggests that digital communication and post-visit interaction remain underdeveloped in the case of Bourbon heritage sites. This points to the need for further studies on digital heritage strategies and their role in long-term visitor engagement (Clemente & Bifulco, 2023; Apollonio et al., 2019).

From a managerial perspective, the data reveals significant gaps between visitors' expectations and the perceived quality of online information available before the visit. Enhancing digital channels to offer more transparent, intuitive, and accessible content could improve the planning phase and align visitor expectations with the actual site experience (Della Lucia et al., 2023; Kara et al., 2023; Russo & Van der Borg, 2002; Fyall et al., 2012). Moreover, strengthening complementary services-such as food offerings, digital ticketing systems, and initiatives to maintain contact with visitors after their visit-could improve both the comfort and the memorability of the experience, ultimately fostering stronger emotional bonds with the site (Presenza et al., 2024; Karacaoğlu, 2024).

The study also identifies a clear interest in more interactive and personalized forms of engagement, including thematic tours and educational activities. Expanding these formats, and embedding them within broader, itinerary-based tourism frameworks, could significantly contribute to increasing visitor involvement and satisfaction (Ford, 2020).

Taken together, these insights-although preliminary-underscore how the analysis of visitor satisfaction can serve as a strategic lever to guide future research and inform the development of more adaptive, sustainable, and visitor-centered destination management practices in the cultural heritage sector.

Research limitation. *While this study offers preliminary insights into visitor satisfaction at Bourbon heritage sites, several limitations should be acknowledged in light of its exploratory nature. The research is based on an initial set of interviews conducted at a limited number of sites, which, although valuable for identifying key satisfaction dimensions, does not yet allow for broad generalization across the wider network of Bourbon cultural locations. Expanding the investigation to include a more diverse range of heritage sites would enhance the robustness of the findings and provide more representative inputs for shaping future destination management strategies.*

Moreover, the reliance on structured interviews and self-reported data, while effective for capturing visitor perceptions, may be subject to certain biases, such as social desirability or memory distortion. Future research could benefit from integrating complementary methods, such as observational studies or real-time visitor tracking, to triangulate and validate the insights gathered.

Another consideration is the cross-sectional design of the study, which offers a snapshot of visitor satisfaction at a specific moment in time. Longitudinal approaches could better capture the evolution of expectations and experiences, providing a more dynamic understanding of how service improvements influence satisfaction over time.

Finally, as digital engagement becomes increasingly central to the cultural tourism experience, there is a need to explore more innovative and responsive methodologies to evaluate its impact. Developing tools to assess digital interactions, before and after the visit, would help capture their role in shaping visitor perceptions more accurately.

Overall, these limitations underscore the importance of scaling up the analysis to build a more comprehensive and actionable foundation for future research and for the development of destination management practices tailored to the specific needs of Bourbon heritage tourism.

Originality of the paper. *The originality of this work lies in several key aspects.*

The study proposes an innovative model of itinerant tourism, connecting Bourbon heritage sites through thematic narratives and integrated visitor experiences. This approach aims not only to increase the visibility of these sites but also to position them as strategic resources within regional tourism development. Furthermore, the study emphasizes the growing role of digital interaction in the visitor experience, highlighting the need to enhance virtual touchpoints both before and after the visit. By expanding digital platforms to support clear communication and effective planning, the study suggests improving the overall visitor engagement. Lastly, the research suggests reinforcing ancillary services, such as resting areas, dining options, and post-visit engagement opportunities, by enhancing the visitor experience with personalized itineraries, interactive content, and post-visit activities. This approach could foster a deeper cultural connection and encourage repeat visits. Lastly, the study contributes to improving local destination management practices by positioning visitor satisfaction analysis as a strategic lever for rethinking and enhancing cultural heritage tourism management practices, promoting sustainable development focused on the visitor. These aspects provide a fresh perspective for enhancing Bourbon heritage tourism, going beyond traditional analyses and focusing on integrated and innovative management strategies.

Key words: *Cultural Heritage; Tourism Bourbon Heritage; Visitor Satisfaction; Destination Management*

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Tackling Grand Challenges: the role of Collective Action in preserving the Mediterranean coastal ecosystem

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Abstract

Grand Challenges like climate change and biodiversity loss require collective multistakeholder actions. Addressing these complex issues involves overcoming normative value differences among stakeholders. This paper investigates the use of rhetoric to pursue meta-consensus as a mean to foster collaboration, trust, and shared governance, creating sustainable solutions and aligning diverse stakeholder objectives for effective collective action. The paper presents the preliminary results of stakeholder analysis and engagement in two Mediterranean sites to propose nature-based solutions enhancing coastal resilience to climate change. Findings highlight differences among stakeholders through mapping, prioritization, and engagement activities, aiding navigation towards meta-consensus and effective collaboration. By understanding stakeholders' perceptions and encouraging them to impersonate others, we can better address conflicts and foster mutual acknowledgment.

Framing of the research. *Complex challenges like climate change, ecological degradation, social inequality and public health came to be known as Grand Challenges (Ferraro et al., 2015; George et al., 2016; Gümüsay et al., 2020). Grand Challenges can be defined as specific barriers that, if removed, would solve significant societal problems with a high likelihood of global impact through widespread implementation (George et al., 2016). These challenges are generally global, affecting large populations (George et al., 2016; Ferraro et al., 2015) and are inherently complex, involving multiple factors, high uncertainty, and temporal non-linearities (Ferraro et al., 2015; George et al., 2016; Bridoux and Stoelhorst, 2022; Lants et al., 2024). Grand Challenges are usually urgent, requiring prompt solutions to prevent further harm and create long-term solutions (Bridoux and Stoelhorst, 2022). Among the main contemporary Grand Challenges the "triple planetary crisis" - referring to climate change, biodiversity loss, and pollution - is considered one of the greatest challenges that human societies have ever faced (Passarelli et al., 2021). Coastal ecosystems are affected by the triple planetary crisis. These ecosystems play a crucial role for socio-economic wealth and provide crucial services to mitigate the impacts of climate change (Reed et al., 2022). However, they are under increasing stress from pollution, overdevelopment, and climate impacts, which include rising sea levels and intensifying storms.*

Such complex challenges generate competition among people priorities (Passarelli et al., 2021). Indeed, different stakeholders prioritize time and profit returns differently (Passarelli et al., 2021; WEF, 2023). For example, economic actors prefer to forego long term investments for climate adaptation in favour of short term returns, while social acotrs and civil society recognise the need for long term investments, provided they do not have interest in short term returns. Investing in sustainability and ecological restoration requires a trade-off between short term economic returns in favour of collective long-term benefits (WEF, 2023). This conflict is then value-laden because it entails reconciling economic imperatives with ethical obligations (Bowen and Heath, 2005) or local needs with global obligations (Potz, 2004), addressing priorities' diversity among people (Gümüsay et al., 2020; Schwoon et al., 2024). These factors, along with normative value differences, affect the importance and urgency stakeholders attach to the challenge, which stimulate slowdowns, uncertainties, and non-optimal solutions (Lantz et al., 2024).

The inhomogeneity among people perspectives exacerbates the intrinsic temporal uncertainty, non-linearity of non-human agents' behavior (Lantz et al., 2024). Such complexity makes pivotal navigating diversity within collective actions combining various sectors, governments, businesses, academia, and non-profit organizations (Ferraro et al., 2016).

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Conflicts can be harnessed as catalysts for better outcomes, bringing different perspectives and improving problem solving through reciprocal acknowledgment, stimulating knowledge sharing, drive innovation, and promote sustainable development (George et al., 2016; Bridoux and Stoelhorst, 2022). As for all Grand Challenges, preserving the costal ecosystem cannot be addressed by a single agent (Ferraro et al., 2015; Bridoux and Stoelhorst, 2022). Management studies recognize the need for collective multistakeholder actions to address grand societal challenges (Arenas et al., 2020; Ferraro et al., 2015), as innovative responses to such challenges (Moog et al., 2015).

The success of these collective actions requires coordination, active collaboration, trust, reciprocity, shared governance and leadership toward a common goal (Bridoux and Stoelhorst, 2022). Thus, designing collective action involves developing common ground among stakeholders, creating a shared perspective, and overcoming normative value differences (Ferraro et al., 2018; Lantz et al., 2024). A solid branch of research focuses on establishing common ground using rhetoric as a mean to shape public discourse, to trigger institutional change, and to stimulate social cohesion motivating action (Burke, 1969). Indeed, rhetoric harnesses the fundamental role of language in shaping individual and collective reality, redefining how the world is interpreted and experienced (Hassan and Prasad, 2025).

Rhetoric can help build common ground among stakeholders about ecosystem-based solutions for coastal ecosystems degradation. Indeed, rhetoric shapes identity through narratives and symbols, framing roles and capabilities (Spaneth and Urbano, 2025). It can redefine cognitive categories or introduce new ones, thus reframing social dynamics influencing public perception and the category itself (Lee and Stiruk, 2025). This aligns to a better collective framing of time and nature which, through scientifically robust framing, can help the convergence of normative values stimulating trust among actors. Ultimately, the rhetoric exercise nurtures legitimacy (Hassan and Prasad, 2025; Erkama and Vaara, 2010), that sparks from the sense of urgency and appropriateness of actions (Lants et al., 2024).

Among the techniques to harness rhetoric to create common ground among stakeholders, the concept of meta-consensus was born to overcome the barriers of normative values differences and develop common solutions (Schwoon et al., 2024). Meta-consensus is achieved through the creation of common ground as "the set of presuppositions that actors, as a result of their ongoing sensemaking and interaction with others, take to be true-and believe their partners also take to be true" (Cornelissen and Werner, 2014). To this purpose, meta-consensus starts from making actors accept to take part in the dialogue, allowing them to enter a safe space of equal confrontation and share a first common purpose (Ferraro et al., 2018). A second step seeks to shift the rhetoric perspective from the substantive to the procedural level, harnessing a participatory architecture approach (Ferraro et al., 2015). To this purpose, a fundamental leading figure are the designated bridging stakeholders, helping participants to agree on basic dialogue rules. (Ferraro et al., 2018; Schwoon, 2024). Achieving meta-consensus then allows a shift from procedural to substantive communication to design common solutions (Schwoon, 2024). Despite this workflow being hard to run in real life, it is an ideal optimal aspiration (Ferraro et al., 2018) and has shown to be promising in structured engagement processes, provided the right emphasis on the role of the bridging stakeholders (Schwoon, 2024).

Successful cases applying meta-consensus seek to focus on stakeholder diversity and the set up of clear communication mechanisms to the purpose of letting different view emerge for reciprocal acknowledgment. (Schwoon, 2024). This process favours to the alignment of objectives and the balancing of goals and priorities, which constitute the backbone of the common ground at the base of collective action.

Purpose of the paper. *Focusing on two pilot sites in the Mediterranean area, where stakeholders must cooperate to address climate change and its impacts on the coast, provides a unique opportunity to examine how divergences, conflicts, and different priorities are reconciled through meta-consensus.*

Taking advantage of this context, the present work and its follow-up, seek to explore the research gaps in literature about meta-consensus for collective action. Despite its potential, several gaps remains, comprising (i) how contextual factors, such as stakeholder compositions and power dynamics, influence the formation of meta-consensus, (ii) how trust, built through meta consensus, translates into sustained collaboration; and (iii) how employing experimental methods enable to test and generalise meta-consensus (Lantz et al., 2024; Schwoon et al., 2024).

Methodology. *Context: The research is developed in the context of the European project AMMIRARE financed by Interreg Italia Francia Marittimo in 2024. The project aims at preserving the coastal ecosystem in Mediterranean area from climate change impacts. Facing the climate change effects AMMIRARE will test nature-based solutions (NbS) -as defined in UNFCCC COP27- in two pilot sites to preserve coastal health. But the implementation of these solutions requires the consensus of the local stakeholders such as companies, sports organisations, institutions. The project pilot sites are the Municipality of Cecina in Tuscany and the Marine Protected areas of Portofino in Portofino. These are two of the most Italian tourist sites. Cecina and Portofino manage the climate change impacts from over twenty years. Coastal erosion and extreme events threaten the fragility of these territories. Cecina and the surrounding area host around 115,000 tourists every year from different Italian regions (Chamber of Commerce north-west,2023). The main impact on Cecina's coast concerns the phenomenon of erosion, which has caused the shoreline to recede by more than 100 metres since 1938. Additionally, the municipality and the local enterprises should manage the presence of seagrasses Posidonia Oceanica whose benefits for the ecosystem and the local economy are scarcely perceived by the community (Ruiz-Frau et al.2018). Portofino hosts around 150.000 tourist yearly (Liguria Region 2024) and is one of the main Italian destination from European and American tourists. Portofino offers various activities: yachting, diving, sport and professional fishing represent a significant economic induced activity. Among the main negative effects of climate change are unusually strong sea storms and the introduction of alien species that may compete for colonisation of the substrate.*

For the cited reasons these sites represent a research opportunity to test the collective action initiatives to achieve a meta-consensus about the solutions aimed at improving the coastal resilience to climate change.

Method: Narrative analysis is the qualitative method adopted to achieve the research purpose. In the context of social sciences, narrative research is both a data gathering and interpretive or analytical framework (Ntinda, 2019).

Snowball sampling (Parker et al. 2019) methodology is applied to identify the local stakeholder to engage.

Data collection: The research is built upon close collaboration between the research team with key managers of Tuscany and Liguria Regions, local municipalities and administrations. We used different types of sources to triangulate our findings using cross-checks (Eisenhardt, 1989; Yin, 2003).

The following data sources have been used in this research:

Secondary data sources: Regarding the context analysis and the stakeholder to involve, we started by collecting information through desk research based on various sources, either directly or indirectly related to the pilot sites. Among other things, these sources included the municipalities and marine protected area websites, chamber of commerce annual reports and dataset, tourist operators guide, environmental reports (for instance "Atlante delle coste" published by ISPRA in 2023), five newspaper articles, scientific articles. An extensive amount of materials was either produced or collected by the research team to analyse the health of the two pilot sites and identify stakeholders to involve.

Observations: Observation in field is one of the main sources for collective action development and allows to assess the process of learning and knowledge to achieve meta- consensus.

To collect observational data, researchers enacted diverse observer roles throughout the project. Observational data were collected in the following settings and involved all research team: (i) during technical project meetings; (ii) during in site visits; (iii) during the workshop and other engagement events.

Interviews: The interviews, which provided qualitative information, began in the early months of the project. Regular interviews conducted for each pilot site, involving multiple stakeholders. The interviews were conducted partly in person and partly online and lasted an average of 45 minutes each. Two interviews were completed, registered and drafted in a report.

Totally, from 2024 to 2025, research team attended 10 meetings including two in site visits with around 150 pages of report (table n.1).

Process description: The team held four technical project meetings involving the components of both the Tyrrhenian pilot cases, plus a national representative between March 2024 and March 2025. The purpose to introduce the project and ensure alignment among the partners throughout the project.

A preliminary collection of data within the pilot cases served to describe the context. For both cases, a first introductory meeting was followed by an interview and a site visit. This process was conducted between March and July 2024, involving the respective regional authorities, the local municipalities, the national parks/protected areas representatives and the scientific partners. By constructing the pilot cases context, the team was able to compile a list of relevant local stakeholders, selected and classified following the criteria by Mitchell et al., 1997 to identify salience of each in relation to the respective coastal ecosystem. The list was later validated and expanded through a subsequent meeting with local partners between July and September 2024.

Subsequently, the team engaged the selected stakeholders set in both pilot cases in structured workshops designed to gather their sentiments and opinions within the frame of the project between December 2024 and March 2025.

Data analysis: By coding the interviews and the feedback from the workshops and meeting, we investigated the main stakeholders' misalignments to overcome for an effective collective action. Through axial coding aggregate dimensions emerged, which have been triangulated with the secondary data collected. The aggregate dimensions represent the issues on which the misalignment between stakeholders is greatest and on which engagement actions need to be focused.

Table n. 1 List of collected data (observation and interviews)

Territorial context	Data	Meeting topic	Setting for observation data	Involved Stakeholder	mode
Tyrrhenian area	21-22 March 2024	technical project meetings	Project progress sharing	5 regional institutions 6 scientific project partners 2 national parks 1 national institution	In person
	3 July 2024	technical project meetings	Project progress sharing	5 regional institutions 6 scientific project partners 2 national parks 1 national institution	In person
	3 December 2024	technical project meetings	Project progress sharing	5 regional institutions 6 scientific project partners 2 national parks 1 national institution	On line
	11 March 2025	technical project meetings	Project progress sharing	5 regional institutions 6 scientific project partners 2 national parks 1 national institution	In person
Cecina pilot site	5 March 2024	technical project meetings	First local project meeting	Tuscany Region, Cecina Municipality, research team	In person
	18 April 2024	in site visits	Technical project presentation	Turscany Region, Cecina Municipality, Municipality consultants, research team, National institution, 2 universities	In person
	30 July 2024	interview (45 minutes)	Context description and stakeholder list sharing	Cecina Municipality, research team	On line
	10 December 2024	participative workshop	Collection of Stakeholder perception	Turscany Region, Cecina Municipality, Municipality consultants, research team, 14 stakeholders	In person
Portofino pilot site	08 May 2024	technical project meetings	First project presentation	Liguria Region, Marine Protected area, research team	On line
	16 July 2024	technical project meetings	Context analysis	Liguria Region, Marine Protected area, research team	On line
	19 September 2024	Interview (45 minutes) and in site visit (1 day)	Context description and stakeholder list sharing	Liguria Region, Marine Protected area, research team	In person
	5 March 2025	participative workshop	Collection of Stakeholder perception	Liguria Region, Marine Protected area, research team, 18 stakeholders	On line

Results. *In the very beginning, the team analyzed local pilot cases and identified stakeholders, categorizing them into policymakers, economic activities and industry associations, scientific entities, NGOs and other associations. (tab. n.2 a-b) During the stakeholder mapping process, the team conducted some field visits and repeated contacts with the purpose of better understanding pilot cases, territorial complexity and contextualise stakeholders' claims. Despite some differences among the cases, similar stakeholders share similar claims.*

Table n.2a Stakeholder mapping results. Portofino pilot case.

Policymakers		Economic activities		Scientific bodies	NGO/associations			Total
Local and regional authorities	Resources management authorities	Industry associations	Unions		Environmental/ cultural associations	Foundations	Volounteer organisations	
6	3	18	2	5	19	3	4	60
9		20		5	26			60

Table n.2b Stakeholder mapping results. Tuscany pilot case

Policymakers		Economic activities			Scientific bodies	NGO/associations			Total
Local and regional authorities	Resources management authorities	Industry associations	Unions	Economic activities		Environmental/ cultural associations	Foundations	Volounteer organisations	
2	5	5	2	7	1	1	0	1	24
7		14			1	2			24

The Portofino case stands out for having twice the participation compared to the Cecina case, primarily due to the significant involvement of NGOs and associations. This was expected, given the complexity of the Portofino territory and insights gathered from in-situ interviews. The Portofino pilot case includes a Marine Protected Area, established due to strong advocacy from local diving groups. Unlike Cecina's underwater morphology, Portofino offers extensive habitats

for marine species, providing a unique experience for divers. This complexity and fragility have led to the emergence of several local environmental groups and a strong research ecosystem.

Another difference between the two case studies is the tourism industry. In Portofino, it is mainly constituted by high-spending visitors, whereas Cecina has a more diverse clientele. Consequently, greater tension is observed in Portofino due to the clash between structured environmental awareness and the demands of a high-quality, high-expectation tourism industry. In fact, during in-situ discussions, the Marine Protected Area representative mentioned that conflicts with local beach clubs are often significant. Highlighting this contrast is one of our primary objectives to design the correct leverages and achieve meta-consensus.

After stakeholders were mapped, they were classified according to their salience using criteria based on power, legitimacy, and urgency. A final score rating defined the saliency of each stakeholder as high, medium, low, or none (see tab 3.a-b).

Tab. 3a. Stakeholder classification results. Portofino case

Salience	Policymaker and institutions	Economic activities	Research bodies	NGO/associations	Total
High	6	15	0	25	46
Medium	3	4	3	1	11
Low	0	0	3	0	3
Total	9	19	6	26	60

Tab 3b Stakeholder classification results. Cecina case

Salience	Policymaker and Institutions	Economic activities	Research bodies	NGO/associations	Total
High	4	10	0	2	16
Medium	2	2	1	0	5
Low	1	1	0	0	2
None	0	1	0	0	1
Total	7	14	1	2	24

Generally, we assessed that institutions gain salience because of their coercive power and territorial management responsibility, economic activities gain legitimacy from their physical exposure to natural events which increase their vulnerability. NGO/associations and Research bodies acquire saliency because of their legitimacy, provided that their existence and action are justified by their mission to protect the natural ecosystem and its recognition by society.

The engagement activities gathered a total of 190 comments in the frame of the Cecina pilot case, and 34 comments in the Portofino pilot case. After the two engagement events, responses were recorded, aggregated and refined. We asserted that the comments, both positive and negative, mainly regarded the following aggregated dimensions: Environmental aspects, Social/cultural aspects, Political-administrative aspects, Economic Aspects, Technical aspects. The main findings for each stakeholder group are hereafter identified.

Entrepreneurs and beach club managers have the imperative of maintaining high quality of service and revenue, which sometimes conflicts with other actors and aspects of sustainability. During the engagement process, economic actors showed trust in the effectiveness of solutions for their specific purposes, but contrasting opinions emerged on the economic impacts. The greatest fears are about aesthetic impacts and the reduction of "marketable" space on the shores. Especially from the aesthetic perspective, results are contrasting; some fear that providing a more natural-looking experience may conflict with tourists' expectations, leading to negative economic impacts, while others think that this renewed look would improve the landscape. One economic actor expressed the following opinions about a NbS in the Cecina case: "(this solution) is effective to protect the shoreline from storm surges" but "the presence of natural waste and Posidonia seagrass represents a problem of beach usability for the beach industry." This ambiguity was retrieved also in other stakeholder categories, especially among institutions and civil society (though the latter mainly shows a positive stance).

Institutions and local authorities are interested in preserving the areas and their economic profitability, but they aim to harness the issue to maintain their political power. Some municipalities expressed fear because the solutions are "not attractive for tourism" and provide a "neglected beach appearance". The fear of reduced space and the unattractiveness of a natural-looking beach was shared by other stakeholders. They also fear putting the burden of maintenance costs on beach clubs, probably fearing a political backlash. Nonetheless, institutions and authorities are unanimously confident that these solutions are effective and can increase global environmental quality because they provide defense while reconstructing a habitat lost to erosion.

Scientific bodies and research centers deeply understand the need for ecosystem preservation and consider the intervention a valuable scientific hub to conduct research and collect valuable information, following the streams of ongoing coastal ecosystem monitoring projects. Scientific and technical bodies also share concerns about the required competencies and means for managing solutions, citing "maintenance costs" and the "need for maintenance" as disadvantages.

Non-governmental bodies and associations push for the realization of the actions. Aside from their moral obligations toward ecosystem preservation, sport associations, diving centers, and other related bodies think that their activities would benefit from the interventions, along with helping in their missions of spreading the culture of attachment to the natural landscape. They share with scientific bodies the concern that beach clubs may show disinterest and antipathy towards proposed solutions, fearing that the beach economy will struggle to understand the benefits of these actions. Additionally, there is a worry that civil society will not grasp their purpose initially. Local institutions also emphasized the need to increase awareness of the solutions' benefits.

Contrary to the fears of economic actors and associations, beach users and coastal residents generally have a positive attitude and think that a more natural look would improve the landscape's attractiveness and economic revenues. They are confident that these solutions would improve the cultural stance for sustainability and environmental preservation. Among local communities and beach users, there is a shared feeling that solutions may bring the co-benefits of increased value and attractiveness of a natural-looking beach. Some think that the increase in beach attractiveness may improve the overall quality of life.

Given stakeholders' personal aspirations, inviting them to impersonate other stakeholders in the second round of engagement allowed for developing a novel perspective on reciprocal acknowledgment. Among our results, we assessed a shared understanding of the fears of economic actors. Indeed, there is a division concerning the aesthetic impact on beach attractiveness, despite the majority having a positive stance. Many think that a reduction in the available shore for beach clubs may be a problem for the local economy. On the contrary, there is mild optimism about the positive cultural impact on environmental awareness that may increase economic value.

Our initial results show a preliminary divergence in perspectives. It emerged a significant contrast between the positions held by those benefiting from the status quo and those advocating for change. Local authorities and economic players show scepticism for potential losses in economic income and political support. Conversely, associations and scientific bodies strive to implement the solutions, driven by a combination of moral obligations, material objectives, or the real potential for scientific research on nature-based solutions. These initial divergence highlights how each group's opinions are intertwined with the primary goals, laying the groundwork for understanding the dynamics of consensus formation.

During the second round, initial signs of convergence could be noticed, as the actors started to mildly acknowledge the positions of those with opposing views, testifying the emergence of meta-consensus. This gradual softening of stances through iterative dialogues encourages the participants to reframe their position, making meta-consensus a higher-tier agreement that evolves through continuous interaction and reflective debate.

Overall, all the actors agree that the solutions would be effective to preserve the ecosystem and show a positive attitude towards their realisation. Yet, some significant differences persist. Economic actors and institutions fear that the unusual shoreline appearance would discourage tourists, while beach users seem not to be bothered by this aspect. It is worth noting that the aesthetic aspect is the most ambiguous due to conflicting comments even within the same category. Similarly, while institutions fear that beach clubs may be unfairly burdened by managing and maintaining solutions (likely due to political backlash), scientific bodies consider realization and maintenance a difficult task, so they consider it crucial to conduct awareness campaigns aimed at economic actors and civil society.

Recognising the dynamicity of meta-consensus provides new insights into stakeholder engagement. By designing structured engagement processes to stimulate acceptability and focused on clarifying contentious issues - such as the aesthetic result and impact on the tourism economy, the burden of maintenance responsibilities - it is possible to promote a strong consolidation of viewpoints. By means of this, meta-consensus balances competing interests as long as facilitating a sustainable collective action.

Research limitations. *The study is based on preliminary results from two pilot cases located on the west coast of the Italian peninsula, which limits the variety of territorial and socio-economic contexts, whereas the process could be replicated in other European territories in the Mediterranean area. Consequently, the main limitations are related to the limited temporal scale and geographical scope of the study, as well as inherent biases from participants' understanding of the rules and expertise in the specific field. The current work focuses on applying the same framework to other pilot cases to provide stronger results and allow for comparability. The research progress is still ongoing, and many other research activities will be implemented. Further developments for the study could emerge from a multi-site analysis and a broader, more varied involvement of stakeholders.*

Managerial implications. *Through our work, we were able to frame stakeholders' differences and aspirations within the context of the applied nature-based solutions in the project. By focusing on mapping stakeholders, studying territorial complexity, and engaging with them, we were able to understand how different actors react to the application of various selected nature-based solutions. We acknowledge that different stakeholders have varying perceptions, influenced by their inherent objectives and nature. Additionally, we recognize that when stakeholders impersonate other actors, they somewhat acknowledge each other, showing similar stances. This is promising for the process of meta-consensus.*

These results can bring insightful managerial implications. Conducting a thorough stakeholder screening and relating it to territorial complexity can provide a clear image of advisable actions and potential caveats. Interfacing with stakeholders allows for deeply understanding their stances, aspirations, and fears, highlighting potential contrasts and conflicts that may hinder the successful application of an action. Conversely, encouraging stakeholders to impersonate other actors helps understanding how they acknowledge each other, emphasizing the barriers to be overcome to achieve

meta-consensus. This process helps to achieve legitimacy, it educates and empowers stakeholders, encourages dialogue, and allows for designing highly effective and least regrettable solutions.

Originality of the paper. *This paper explores meta-consensus in marine coastal ecosystem preservation. Building meta-consensus starts with understanding people's feelings, opinions, and priorities to foster trust, legitimacy, and collaboration. The paper's originality lies in designing a stakeholder engagement process aimed at developing meta-consensus for NbS implementation. The main objective was to understand differing views and their causes to design a strategy for navigating differences and building meta-consensus.*

The focus was on mapping stakeholders, the complexity of the territories, and their challenges and objectives. This involved framing pilot cases and iterative interactions, such as in-situ interviews, to develop a deep understanding of each case. Stakeholder engagement activities aimed to grasp stakeholders' thoughts and feelings on proposed solutions, confronting them with their roles and aspirations. Highlighting contrasts and differences among stakeholders is a key challenge in establishing meta-consensus, which is a significant contribution of this work.

Further development of this approach will contribute to the literature on meta-consensus and the challenges of overcoming conflicts in collective actions for ecosystem preservation, by constructing a balanced view among stakeholders' priorities and their reciprocal acknowledgment.

Key words: *Collective actions, grand challenges, meta-consensus, nature-based solutions, stakeholder engagement*

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Knowledge-Driven Innovation in Tourism SMEs: A Systematic Literature Review

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Abstract

Research on innovation in small and medium-sized enterprises (SMEs) within the tourism sector is increasingly recognised as relevant among scholars. This paper explores these concepts through the lens of knowledge, which acts as a vital driver for tourism innovation processes. The intersection of absorptive capacity (ACAP) and organisational learning (OL) is highlighted as an effective method for managing external knowledge (EK). This paper emphasises that the existing literature in this domain remains disjointed, thereby underscoring the necessity for further investigation to augment the comprehension of the subject matter. This study adds to the discourse on tourism innovation by conducting a Systematic Literature Review (SLR) with narrative synthesis to examine how scholars interpret ACAP and OL, their respective roles, and how these knowledge-related concepts foster innovation by exploiting EK. Research gaps are identified, and potential future research directions are suggested within the distinct context of tourism SMEs.

Framing of the research. *Tourism is a fundamental driver of global economic growth, cultural exchange, and social development. As one of the largest industries in the world, which has established its significance as a productive sector, particularly over the past 40 years, it plays a significant role in contributing to GDP (López-Bonilla & López-Bonilla, 2021) in both developed and developing countries (e.g. Holzner, 2011). While tourism displays the typical characteristics of a services sector, its distinctive traits render it a unique phenomenon that diverges from the definition of the traditional economic sector (e.g. Camisón & Monfort-Mir, 2012; Williams & Shaw, 2011). Indeed, it consists of dispersed activities across time, space, and nature that must be dynamically integrated and coordinated among distant participants in physical, organisational, and cognitive aspects (Aldebert et al., 2011). Moreover, it is fundamentally customer-driven, with customers viewed as prosumers who act as both producers and consumers (Pikkemaat et al., 2018).*

Tourism is also a turbulent, dynamic and ever-changing sector in which innovation plays a crucial role as a driver for the global competitive standing of businesses and destinations, by helping them to adapt to a constantly changing world, and continue delivering appealing customer services (e.g. Camisón & Monfort-Mir, 2012; Hall & Williams, 2008; Hjalager, 2002). Considerable research has investigated several aspects of innovation, including, among others, types (e.g. Camisón & Monfort-Mir, 2012; Hjalager, 2010), technological applications (Buhalis & Law, 2008), collaborative innovation forms (e.g. Marasco et al., 2018; Novelli et al., 2006), and barriers (e.g. Hall & Williams, 2008), further enhancing the understanding of its complex nature. Despite the growing evidence that innovation is a crucial competitive driver, this remains an unresolved issue among tourism companies, as noted in the literature (e.g. Camisón & Monfort-Mir, 2012; Hall & Williams, 2008; Hjalager, 2010).

SMEs exhibit unique characteristics related to their form, informality in relationships and activities, internal resources, and managerial approaches (Woods & Joyce, 2003). Unlike large companies, SMEs can operate efficiently while managing organisational costs and possess the potential to forge strong connections with their customers, utilising proximity that enables them to adapt to their needs swiftly (Keskin, 2006).

In the tourism sector, SMEs represent roughly 80% of the entrepreneurial landscape (UNTWO, 2022); this underscores the importance and intricacy of research in this field. Importantly, there is a sustained emphasis on niche markets (e.g. Middleton & Clarke, 2001) where tourism SMEs flourish, capitalising on these segments to achieve competitive advantages and maintain their operations over time. However, while they enjoy greater flexibility and agility than larger companies, they face ongoing challenges to maintain market competitiveness due to limitations in capital, research and development (R&D), and human resources (Novelli et al., 2006; Thomas et al., 2011).

<u>The Role of Knowledge</u>. EK refers to information, expertise, and insights that originate outside an organisation and can be leveraged to enhance innovation, decision-making, and overall competitiveness. It may originate from different sources, such as customers, competitors, suppliers, and industry networks. It may also stem from universities, research institutions, government agencies, patents, publications, industry reports, partnerships, and online communities, among others. This aligns EK with the Open Systems Theory (Katz & Kahn, 1966), which conceptualises organisations as

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dynamic entities that constantly engage with their external environment. Considering this dynamism, Hjalager (2002) states that knowledge bases are the foundation for change and innovation processes, influencing how system boundaries evolve. These system boundaries are not fixed but shift over time alongside the development of knowledge bases (Hjalager, 2002).

EK prerogatives are evident in innovation, tourism, and SMEs. EK drives innovation by exposing firms to novel ideas and practices. Fagerberg et al. (2006) found that in the innovation literature, firms depend heavily on external sources rather than looking internally. Nonaka et al. (2001) claim that knowledge networks become crucial to sustaining a long-term competitive edge by generating new knowledge and advancing innovation.

EK plays a vital role in dynamic industries like tourism (Thomas & Wood, 2015; Williams & Shaw, 2011) where firms must quickly adapt to changing consumer preferences, technological advancements, and market trends. Mina et al. (2014) found that service firms adopt open innovation systems, investing minimally in internal R&D while depending on suppliers, customers, and business networks.

SMEs often face challenges in terms of fragmented activities, resource access constraints, and a scarcity of expertise that can hinder their ability to innovate (Cooper, 2006; Thomas et al., 2011). Consequently, EK results are vital for SMEs to overcome resource constraints, foster innovation, and maintain a competitive edge (e.g. Hall & Williams, 2008; Hjalager, 2010; Thomas et al., 2011). Moreover, given the limited knowledge base due to their size, SMES need to be able to exploit external sources of knowledge (e.g. Desouza & Awazu, 2006; Grandinetti, 2016) and specifically external networks, as an input to both knowledge and innovation (Rogers, 2004).

However, generally firms may struggle to absorb or transfer knowledge due to its tacit nature (Shaw & Williams, 2009) and their insufficient expertise or rigid organisational structures. Additionally, not all EK is immediately beneficial for the firm; it needs to be filtered and adjusted for its particular context; while it can be properly assimilated and is available, there may be various reasons why it remains unused (Davenport & Prusak, 1998). This poses specific challenges for tourism SMEs in utilising EK.

The confluence of ACAP, innovation, and the context of SMEs presents a unique area of inquiry within organisational and tourism studies. The construct of ACAP has garnered significant attention within organisational research, emerging as one of the most significant concepts in recent decades (Lane et al., 2006), as a central theme in discussions of innovation, knowledge management, and strategic competitiveness (Thomas & Wood, 2015; Zahra & George, 2002). Defined as the firm's "ability to recognise the value of new information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128), ACAP is not merely a passive reception of knowledge, but an active and dynamic process (Cohen & Levinthal, 1990; Thomas & Wood, 2015). The initial conceptualisation of ACAP has been refined and extended by subsequent scholars, who have emphasised the dynamic and multi-faceted nature of ACAP (Sun & Anderson, 2010; Thomas & Wood, 2015; Todorova & Durisin, 2007; Zahra & George, 2002). Zahra and George (2002) characterise ACAP as a dynamic capability, highlighting an organisation's capacity to adapt its core competencies according to evolving environmental requirements. This viewpoint emphasises ACAP's significance as a resource for navigating variable market conditions and maintaining a competitive edge, enabling firms to implement strategic transformations (Nieves & Haller, 2014; Sun & Anderson, 2010). Zahra and George (2002) proposed four dimensions of ACAP (acquisition, assimilation, transformation, and exploitation), offer a nuanced perspective by distinguishing between potential absorptive capacity (PACAP) and realised absorptive capacity (RACAP). PACAP encompasses a firm's ability to acquire and assimilate new knowledge, which involves scanning the external environment, identifying relevant information, and understanding its potential value (Valentina & Passiante, 2009). RACAP focuses on the transformation and exploitation of knowledge. Exploitation primarily relates to the ability to innovate, specifically transforming knowledge into new products or processes (Binder, 2019; Zahra & George, 2002). The relevance of ACAP as a means to effectively absorb EK and a critical driver of innovation has been broadly recognised (Awad & Ghaziri, 2008; Cohen & Levinthal, 1990; Sun & Anderson, 2010; Thomas & Wood, 2014; Todorova & Durisin, 2007; Zahra & George, 2002). Costa and Monteiro (2016) highlight that merely acquiring knowledge does not drive innovation, as innovative outcomes significantly improve when knowledge acquisition is paired with absorption capacity and knowledge sharing. Various factors, including market conditions, the type of knowledge being integrated, and the firm's capacity to safeguard its intellectual property, can all affect how effectively ACAP leads to concrete innovation results (Sun & Anderson, 2010; Thomas & Wood, 2014).

These conditions are typical of the continually evolving tourism sector. Tourism organisations, especially SMEs, significantly depend on EK sources to foster innovation (Thomas & Wood, 2015). In contrast to larger companies that have specialised R&D teams, tourism SMEs typically rely on external connections-like suppliers, customers, and business networks-to obtain innovative ideas and practices (Grandinetti, 2016). Given the tourism industry's unique characteristics and the specific traits of SMEs, a distinctive context for ACAP and peculiar modalities in capturing knowledge and its absorption and utilisation are required (Thomas & Wood, 2015). This resonates with broader conversations about the reification of ACAP, as researchers warn against applying the concept without considering its specific context. Lane et al. (2006) argue that ACAP has been overly simplified, as researchers frequently treat the construct superficially. They suggest numerous studies have not effectively represented ACAP's dynamic and complex nature, often depending on limited metrics like R&D spending instead of considering learning and knowledge dimensions.

Building and sustaining ACAP is essential for a firm's long-term survival and success because it can enhance, complement, or redirect the firm's knowledge base (Thomas & Wood, 2014). This is particularly important for SMEs,

which frequently deal with resource constraints by strategically forming external partnerships that foster innovation. Respect, trust, and reliability are crucial to this development (Grandinetti, 2016).

OL is a critical process that enables firms to adapt, innovate, and remain competitive in dynamic business environments. In their seminal work, Argyris and Schön (1978) argued that OL goes beyond individual learning, explaining that it is a complex and evolving process involving the entire organisation and necessitating structures, systems, and an ability to adapt and react to a changing environment. Similarly, Sun and Anderson (2010) emphasise that learning processes occur at individual, group and organisational levels. The centrality of the concept of learning led Senge (1990) to introduce the term "learning organisation", and over the years, the relationship between learning and knowledge has gained significance, and in one of the various conceptualisations, Garvin (1993, p. 80) defined a learning organisation as "an organisation skilled in creating, acquiring, and transferring knowledge and at modifying its behaviour to reflect new knowledge and insights."

The OL conception then shifted from a closed process viewpoint, confined to the organisation's boundaries, to an open process perspective, where the significance of the firm's external environment has become relevant. Subsequent ideas, including the dynamic capability view and knowledge management, significantly shaped and enhanced the concept of OL as an open process (Vera et al., 2011). In this scenario, considering dynamic capabilities as a company's capacity to adjust to environmental demands by modifying its resources that create value (Teece, 2007; Vera et al., 2011), Sun and Anderson (2010) extend the dynamic capability perspective to ACAP as a distinct type of OL that relates to an organisation's interaction with EK. Also, Lane et al. (2006) consider ACAP related to a company's essential learning process, confirming the conceptual affinity between the two constructs. In addition, the concept of dynamic capability allows for the consideration of OL as an essential tool for the strategic renewal of organisations amid ongoing changes (e.g. Crossan et al., 1999), innovation (e.g. Cohen & Levinthal, 1990; Nonaka & Takeuchi, 1995), performance and competitive advantage (e.g. Abdollahi et al., 2023).

In their seminal work, Argyris and Schön (1978) developed a foundational OL framework containing three different learning constructs describing different depths of learning within an organisation: single-loop learning, double-loop learning, and deutero-learning. Their concept strengthens the link between OL and innovation. Single-loop learning involves focusing on efficiency and problem-solving within established routines and policies; organisations detect and correct errors without challenging their underlying assumptions. This is coherent with the concept of incremental innovation (March, 1991). Double-loop learning involves a deeper analysis of organisational practices by challenging the underlying assumptions, values, and norms; rather than simply fixing errors, organisations reconsider the validity of their current processes, which is coherent with radical innovation (Fiol & Lyles, 1985). Finally, Deutero-Learning (Bateson, 1972) or "learning to learn", refers to organisations' focus on how they learn to enhance their capacity for continuous adaptation and innovation. This process involves cultivating a culture of learning where employees are encouraged to experiment, share knowledge, and improve decision-making, which is coherent with continuous learning.

OL is a relatively new aspect of tourism research (Ghaderi & Paraskevas, 2022). Abdollahi et al. (2023) affirm that tourism organisations should be based on knowledge, and OL tools are essential for enhancing their competitive advantage and ensuring customer satisfaction. Knowledge-and consequently learning-derived from external sources as networks are crucial for OL and should form the foundation, particularly in the highly competitive tourism industry, which relies on interdependent businesses (Novelli et al., 2006).

Purpose of the paper. *The concepts of EK, ACAP, and OL are functionally interconnected and require a thorough understanding of their dynamics. However, the existing literature rarely addresses these concepts together in the context of innovation in tourism SMEs, resulting in a fragmented and limited representation. Given this fragmented representation, this study aims to recompose it by analysing the intersection of these knowledge-related concepts, advancing the theoretical understanding of how tourism SMEs utilise knowledge to innovate. Moreover, this study aims to clarify how scholars consider these concepts in their studies and identify gaps and future research directions. Based on the aforementioned points, the following research questions guide this study: How do absorptive capacity, organisational learning and external knowledge influence innovation in small and medium-sized enterprises within the tourism industry?*

Methodology. *To answer the research question, a systematic literature review (SLR) is conducted to synthesise research on ACAP, OL and EK for innovation in tourism SMEs to ensure an objective, transparent, and replicable procedure (Tranfield et al., 2003). The PRISMA protocol (Page et al., 2021) serves as a guiding tool for implementing the SLR. The work is organised along the following stages: identification of keywords, data collection and quality assessment, data synthesis.*

Leading keywords are identified starting from the three research pillars, innovation, tourism, and SMEs, and the three knowledge-related concepts of external knowledge, absorptive capacity, and organisational learning. After a selection based on prior studies, 55 synonyms were added for each leading keyword (e.g., dynamic capacities for ACAP, learning orientation for OL, knowledge transfer for EK, small firms for SMEs, Hospitality and Tourism Management for tourism). This inclusion was necessary due to the vast diversity of terminology found in a previous literature assessment.

Data were collected by searching three databases, WoS, Scopus and EBSCOhost, combining keywords with boolean "AND" and "OR", in order to include always the three leading keywords regarding the research pillars and at least one of the three knowledge-related keywords and their synonyms. The search was performed in titles, abstracts, and keywords

of all types of documents, with no restriction concerning the publication year, but a restriction to items in the English language. A total number of 154 items was found.

The quality assessment consisted of two screening stages, adopting exclusion criteria. In the first screen, titles and abstracts of the 154 items were analysed, and the selection was made by excluding duplicate items, and also books, conference papers, conference reviews, corrections, editorials, erratum, notes, proceeding papers, short surveys, and articles not published in peer-reviewed journals. Moreover, the exclusion criteria were applied to those items that did not meet the primary focus in innovation, tourism and SMEs. The second screen focused on in-depth reading and a final decision about including an article in the analysis. The exclusion criteria pertained to the presence and relevance of ACAP, OL, and EK perspectives; indeed, the fragmented depiction of these three knowledge-related concepts necessitates a comprehensive analysis that includes both explicit and implicit references to them in the papers screened. A manual search in the Q1-level journals in tourism research was used in order to include relevant articles not covered by the process but considered valuable for a comprehensive understanding of the knowledge dimensions considered in the context investigated. At the end of these stages, 75 articles were admitted to data synthesis. The relatively small sample of articles under synthesis is largely due to the specific focus on innovation in an already narrow path, such as that of tourism SMEs.

The articles included in the data analysis are currently undergoing a narrative synthesis to highlight key themes and conceptual relationships between the constructs considered. The analysis is performed using NVivo software.

Results. *Some preliminary findings from the ongoing analysis are expected to be unveiled. One of the findings is likely to be the fragmented nature of existing research. While all three concepts are fundamental to innovation, they are often examined in isolation rather than as interconnected components of a systemic framework. This lack of integration suggests that a more holistic approach could enhance the understanding of how knowledge is acquired, transformed, and leveraged within tourism SMEs.*

Additionally, the literature emphasises the link between knowledge and firm performance, frequently positioning innovation as a mediating variable. This perspective highlights the importance of innovation as a conduit through which knowledge absorption and learning translate into competitive advantage. However, it also suggests that alternative or complementary conceptualisations-such as the mechanisms which explain the linkage between knowledge and innovation-may be underexplored.

Another observation is the prevalence of quantitative studies in the field. While quantitative analyses provide valuable empirical validation, they may overlook the depth and contextual nuances that qualitative approaches could offer, particularly in understanding the processes and mechanisms behind EK, ACAP, and OL in fostering innovation. This methodological imbalance calls for further exploration through qualitative or mixed-methods research to capture the experiential and strategic dimensions of knowledge integration.

Finally, a notable share of contributions to this body of research originates from non-tourism journals, accounting for approximately 45% of the relevant literature. This indicates that discussions on knowledge absorption and learning extend beyond the tourism field, drawing from broader management, innovation, and organisational theory perspectives. While this cross-disciplinary engagement enriches the theoretical foundations, it also raises questions about the extent to which tourism-specific dynamics are adequately addressed.

Research limitations. *The study encounters several limitations. First, it exclusively focuses on peer-reviewed academic journal articles. Second, relevant articles may be overlooked during the literature search and subsequent refinements. A third limitation pertains to the keywords used in the search process; given the variety of terms and synonyms associated with the key concepts, this may lead to issues of comprehensiveness. Finally, the subjective nature of evaluating the presence and relevance of ACAP, OL, and EK perspectives in the articles examined and their nuanced terminology can result in some exclusions and inclusions being open to question.*

Managerial implications. *This research provides important insights at the intra-organisational level, encouraging owners and managers to integrate the knowledge-based concepts of ACAP and OL into their innovation strategies by effectively transforming EK. This integration can subsequently be converted into internal business strategies that involve employees, including recruitment and human resource management practices. However, this can be particularly challenging in the tourism industry, which is characterised by high turnover rates and rapid changes that prompt SMEs to adapt swiftly to a dynamic environment but can hinder their capacity to innovate.*

At the inter-organisational level, possessing a systemic view of EK, ACAP, and OL can assist tourism SMEs practitioners in effectively managing their relationships with external stakeholders, including customers, suppliers, competitors, institutions, and network participation. This may enhance their innovation capability by improving their supply chain management and customer engagement.

Originality of the paper. *The paper emphasises SMEs' relevance and unique characteristics in operating in the tourism sector. It highlights the necessity for further research on innovation at a SME level, as most existing studies focus on large firms. By highlighting the fragmented nature of existing research on how tourism SMEs utilise knowledge to foster innovation, the paper timely calls for a systematic consideration of the intersection of EK, ACAP, and OL, an underexplored research field. To the authors' knowledge, this is the first attempt to systematically review the integration of EK, ACAP, and OL within the research field of innovation in tourism SMEs.*

Key words: *innovation; tourism SMEs; external knowledge; absorptive capacity; organisational learning; literature review*

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Does the eco-entrepreneur exist in Italian hospitality? Some evidence from the tourism sector

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Abstract. *This study investigates the eco-entrepreneur in the hospitality industry in Italy, examining the characteristics that allow this figure to be identified and the motivations, practices, impacts, opportunities, and challenges that eco-entrepreneurs encounter along their path.*

The research adopts a multiple case study methodology to explore the topic holistically, focusing explicitly on six small businesses in the Italian hospitality sector located in regions in northern and central Italy. The primary data collected through semi-structured interviews was coded using NVivo 14 software to code the textual data and extract valuable information. The primary data was triangulated with secondary data from company websites, communications on the Booking online platform and more. The six cases analysed were selected as structures certified as sustainable by Booking, as they had obtained green certifications from certifying bodies.

The results highlighted some essential characteristics for identifying the eco-entrepreneur, namely his commitment arising from personal awareness and lifestyle. These aspects encourage eco-entrepreneurs to commit to conserving natural resources, efficient waste management and promoting local products, for example, by supporting local suppliers. This commitment shows results regarding corporate image, reputation and customer trust, even if the economic benefits remain difficult to measure and unclear concerning the various initiatives implemented. A long-term goal of eco-entrepreneurs is to achieve a high level of employee and public involvement, which can help them achieve important strategic objectives such as competitiveness and resilience. However, eco-entrepreneurs face challenges like high investment costs, a complex regulatory landscape, and the need to raise consumer awareness.

The study guides hotel operators in adopting and developing green and socially responsible initiatives in their local area. It also indicates potential actions for politicians to simplify the complex process of environmental and regulatory certification, simplify, standardise, and encourage collaboration between the various parties involved.

This research aims to contribute to eco-entrepreneurship in the Italian tourism sector, a particularly interesting context to explore considering the high tourist flow and the prevalence of small accommodations. Thanks to their small size and flexibility, these businesses could proactively pursue such transformations. The study offers many points for reflection that could be expanded and explored in more depth in the future in other industries, sectors and countries, developing comparisons with economic, social, cultural and political contexts different from the Italian one to understand what characteristics the eco-entrepreneur has elsewhere.

Framing of the research. *In the tourism sector, environmental issues are attracting increasing attention, especially with the rise of public awareness regarding sustainability and ecological responsibility. Society and local communities are putting increasing pressure on the tourism sector, particularly the hotel industry, to integrate environmental considerations into business activities (Anci, 2017). This growing pressure and interest have given rise to eco-entrepreneurship, which combines the principles of entrepreneurship with ecological aspirations (Anci, 2017), bringing about a convergence between environmental sustainability and economic growth. Green entrepreneurs are catalysts for adopting environmentally friendly and responsible practices (Thompson et al., 2017). By aligning business initiatives with sustainability objectives, these actors help promote healthy economic growth while safeguarding the heritage of the regions in which they operate (Gast et al., 2017). According to Kainrath (2009), three elements are central in shaping eco-entrepreneurship initiatives: eco-innovation, eco-commitment and eco-opportunity. Eco-innovation focuses on designing creative solutions to ecological problems (Gast et al., 2017). Eco-commitment means integrating sustainability into core operations (Schaltegger, 2002). Eco-opportunity means recognising and capitalising on environmental opportunities so that they align with business goals (Schaltegger & Petersen, 2001). Thompson et al. (2018) also highlight*

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some traits that lead to identifying a successful eco-entrepreneur in the tourism sector: stakeholder engagement, i.e., a participatory approach that ensures initiatives reflect society's aspirations (Thompson et al., 2017); revenue generation, an aspect that leads to sustaining and replicating implemented green practices (Gast et al., 2017); environmental education, i.e., environmental awareness to foster a collective ethic of sustainability to make informed decisions about resource use (Thompson et al., 2017); and finally, prevention of over-tourism, i.e., managing visitor flows to avoid ecological degradation and cultural disruption (Thompson et al., 2018). Therefore, creating robust eco-entrepreneurship within the tourism sector requires an integration of the core principles of sustainability, an ongoing commitment to the environment, the strategic pursuit of innovation and market opportunities, and the ability to translate eco-values into effective management practices. Tourism eco-entrepreneurs can promote economic growth and environmental and social benefits, ultimately contributing to the resilience and sustainability of travel destinations (Gast et al., 2017; Schaltegger, 2002; Thompson et al., 2017).

Despite various opportunities, eco-entrepreneurs need to know how to address various barriers and obstacles along this process, such as consumer environmental awareness (Linnanen, 2002). An aspect that requires considerable cultural and behavioural change that can lead consumers to purchase goods that may have higher initial costs but offer long-term environmental benefits (Gast et al., 2017; Pastakia, 2002). In addition to environmental awareness, another critical barrier Linnanen (2002) highlighted is the difficulty of attracting funding. Eco-startups typically require significant upfront investments in technology, innovation, and research and development (R&D) but often have slower or lower returns in the short term (Gibbs, 2006; Lordkipanidze et al., 2005). Thus, eco-entrepreneurship has many barriers, e.g., finance, consumer perception, regulation, and general market inertia. Overcoming these barriers can lead eco-entrepreneurs to reshape current production and consumption systems to pursue a more sustainable and socially equitable economic landscape. Eco-entrepreneurship is both a catalyst for creative disruption and an illustration of the possible synergy between ecological responsibility and commercial viability.

Purpose of the paper. *The research aims to identify the characteristics that make the eco-entrepreneur identifiable and enrich existing theories on eco-entrepreneurship. Not only that, but it also aims to analyse the obstacles and barriers that it faces during eco-entrepreneurial activity. The research question, therefore, could be structured as follows:*

RQ: What are the typical characteristics of eco-entrepreneurs in Italy, and what are the main obstacles they face during their business activities?

To answer this research question, the study adopts an exploratory methodology, namely multiple case studies, and conducts a subsequent content analysis of the interviews using NVivo 14 software. The sample of subjects interviewed includes entrepreneurs from 6 Italian accommodation facilities. Therefore, the manuscript addresses several key research objectives: to identify the characteristics and motivations of eco-entrepreneurs in the Italian hospitality sector, examine the sustainable practices they adopt, evaluate the results, and highlight the main challenges and opportunities emerging.

The study, which also aims to enrich the body of empirical evidence, provides valuable insights into how eco-entrepreneurs can contribute to achieving objectives that are much broader than just economic return, such as the development of sustainable tourism support for the local area and long-term economic resilience. Therefore, the study provides relevant recommendations for tourism entrepreneurs and policymakers to create an environment where it is easier to implement such initiatives through consistent and streamlined regulation.

Methodology. *To achieve the exploratory objective of the research, the study adopts a methodology based on the analysis of multiple cases that allows us to go into depth on a phenomenon (Dooley, 2002; Yin, 2013). The study of various cases is a methodology widely adopted in tourism literature (Buhalis & Amaranggana, 2014). This methodology appears suitable for studying complex topics such as innovative strategies, sustainability practices, and complex tourism offers involving different stakeholders, all of which fall under the definition of eco-entrepreneurship (Tasci et al., 2020).*

The study focuses on Italy because of its rich heritage and high influx of tourists. Italy, therefore, represents a unique context for examining ecological entrepreneurship, especially considering the evident prevalence of small businesses within the Italian tourism market, characterised by great agility and ability to adapt to new market demands (Lordkipanidze et al., 2005). These characteristics can put small businesses in a unique position, able to influence even the largest organisations in the sector (Lordkipanidze et al., 2005). For these reasons, the hospitality sector in Italy, with its vast network of small and medium-sized enterprises, represents the perfect context in which to study how entrepreneurs integrate sustainable practices into their businesses.

The sample was identified using the purposive sample method and through a combination of inclusion and exclusion criteria. Only those accommodation establishments that have obtained recognition from the OTA Booking platform as attentive to sustainability were included. All hotel chains were excluded precisely to focus attention on small and medium-sized businesses where the entrepreneurial figure is particularly relevant. From 2024, accommodation facilities that meet the sustainability criteria of the Booking platform must have obtained a sustainability certification[5] (such as Green Key,

[5] https://greenkeyglobal.com/eco-rating/
https://www.greenpearls.com/
https://www.gstcouncil.org/gstc-criteria/gstc-industry-criteria/
https://www.gstcouncil.org/gstc-criteria/gstc-industry-criteria-for-hotels/
https://environment.ec.europa.eu/publications/tourist-accommodation-user-manual_en

Green Pearls, GSTC and EU Ecolabel) from a certifying body. The sample included 32 facilities, 6 of which were available for the interview.

Before proceeding with the interviews, a focus group was conducted with seven experts in the sector, which allowed us to explore the peculiarities of the topic in depth and to draw up an interview protocol based not only on the reference literature but also on essential insights that emerged from practice.

The facilities interviewed are in different northern and central Italian regions and were founded between 1995 and 2021. The facilities included in the sample differ in terms of size and number of rooms, ranging from 6 to 50 rooms. This is an interesting aspect in terms of providing greater variety in terms of management and relative complexity. The certifications obtained from the interviews are diverse, including GSCT, EU Ecolabel, Green Pearls and Green Key. The majority of key informants interviewed were female and belonged to a middle-aged group (40 to 55 years old).

The study involved six semi-structured interviews with open-ended questions with the key informants of each selected company, i.e., the entrepreneurial figure, to discuss their vision and motivation in depth. The interviews were conducted using the Microsoft Teams platform, recorded, and transcribed with the consent of the interviewees. They lasted, on average, about 40 minutes and were conducted between December 2024 and February 2025.

The interview protocol included open-ended questions to explore the following topics: 1) Motivation and entrepreneurial vision; 2) Adoption of sustainable practices; 3) Impact and results of these initiatives; and 4) Challenges and opportunities for eco-entrepreneurs.

Secondary data, collected from published material on websites and other communication channels, was triangulated with the primary data to learn more about the organisations interviewed. The interviews were analysed using content analysis with NVivo 14 software, a method that allows for the reproducible and systematic coding of large volumes of extensive textual data (Krippendorff, 2018). The coding was carried out using an inductive and manual approach, and all the authors were operationally involved, only discussing with each other in case of disagreement.

Results. *The findings reveal the multiple environmental and social practices implemented by eco-entrepreneurs, the expected results, the opportunities and challenges arising from these initiatives, and the motivations that led these entrepreneurs to take this path. Among the practices most dear to eco-entrepreneurs are all the initiatives aimed at conserving the crucial and scarce natural resources of the territory in which they operate, such as water or energy, with the aim of* "turning every waste product into a resource*" (Company A).*

The reasons that push an entrepreneur to become an eco-entrepreneur mainly derive from a personal commitment, a marked sensitivity to the theme, the lifestyle led, and the education transmitted by one's family regarding values. In addition to this personal commitment, there is also the desire to contribute to the conservation of the resources and heritage of one's land to preserve its traditions and authenticity, as supported by company A: "For me, sustainability is not only environmental sustainability but sustainability as an entrepreneur and as a human being living in the territory*" and from company D,* "Saving water also highlights the attention to the territory, which, as we know, is a big problem, especially in our region. This is very important because our region is, unfortunately, one of the regions that has faced a lot of droughts in recent years... It's the least we should do, especially considering that in our region, all the structures are old; therefore, it is not easy to find structures with a low environmental impact. Therefore, the drive towards eco-entrepreneurship does not come from a market-driven push, but from a personal and inner motivation to actively contribute to reducing the environmental impact and improving the impact on society and the local community through their activities*". In this sense, the companies support the local area by purchasing products from local suppliers, supporting local companies and promoting sustainable mobility for employees and tourists (Companies A, C and F).*

In terms of results, the main objective is to increase the involvement of consumers and employees in pursuing a common mission. Communication on social media and other platforms regarding the practices and commitment adopted by the businesses fulfils this objective of promoting greater involvement but also contributes to greater credibility and corporate reputation. Communicating this commitment increases the value of the product offered, increasing the trust of the parties involved. Economic results, such as savings and income, are more difficult to evaluate than company initiatives.

Among the opportunities that emerged is the possibility of collaborating with experts, as stated by company B: "I collaborate with experts, people who are dedicated solely and exclusively to understanding all the legislation and everything that needs to be done for sustainability*" but also the extensive use of technology as a tool for monitoring consumption, for example through home automation technology, which, as company F argues,* "introduces a concept of data monitoring especially in our sector where there is little data collection and no sharing of data*".*

However, the multiple difficulties and obstacles that eco-entrepreneurs encounter along the way are related to the extensive time required to obtain certifications, the structural limitations that make it more challenging to transform old accommodation facilities into sustainable ones, the problematic evaluation of economic return and the need to overcome high investments, complex bureaucracy and poorly unified regulations. Therefore, considerable efforts are still needed to involve staff and the public in learning and education.

Discussion. *The results show that some of the distinctive characteristics of eco-entrepreneurs are their commitment and their strong desire to preserve the local heritage in which they operate, aspects that emerge as elements that guide the direction of eco-entrepreneurs in Italian accommodations. This confirms what is suggested by Anci (2017), who argues that eco-entrepreneurs are motivated by a mixture of ecological aspirations aimed at community well-being. Thus, such personal motivations significantly shape entrepreneurial goals (Schaltegger, 2002).*

Eco-entrepreneurs act by adopting multiple sustainable practices, such as conserving scarce natural resources, managing waste, and promoting local products and activities (Thompson et al., 2018). In addition, an interesting aspect is technology that falls under eco-innovation, as defined by Kainrath (2009), with, for example, the use of renewable energy or home automation for increased monitoring of consumption data. Additional initiatives include those related to encouraging sustainable mobility among consumers and employees.

The results of such initiatives include improved reputation and greater consumer and employee involvement. As Schaltegger (2002) and Mananda (2024) indicate, transparent and clear communication of sustainable practices helps build credibility and trust, elevating the perceived value and quality of ecotourism services. However, the economic benefits remain ambiguous and challenging to quantify, reflecting Linnanen's (2002) observation about non-financial success metrics prevalent among eco-entrepreneurs. Aquino et al. (2018) noted that educational impact on consumers and staff by promoting greater sensitivity to environmental issues can lead to socio-cultural benefits in the long run.

Thus, all six companies can be defined as "green companies", as Isaak (2002) defines "green companies" as they have become sustainable along their growth and development path and have been deeply influenced by the founder's personal experiences, family or friendship networks. Finally, they are all driven by challenging certification-related environmental projects (Schaltegger, 2002). These are, therefore, accomodation facilities guided by the work of eco-entrepreneurs who have nevertheless had to face various challenges and obstacles associated with the high initial investment costs, the complex regulations that require a lot of time to be adequately understood, the difficulty of quantifying the economic returns of these initiatives precisely, and the need to educate consumers and their employees due to a lack of awareness in terms of sustainability in Italy. These obstacles confirm the broader barriers to eco-entrepreneurship, discussed in the literature, about the Italian landscape (Linnanen, 2002; Lordkipanidze et al., 2005; Gast et al., 2017).

Research limitations. *The study, however, is not without limitations. First, the number of cases could be amplified, and second, the number of cases could also be expanded beyond Italian territory to identify differences between economic, political, social, and cultural contexts. The eco-entrepreneur could take on different connotations depending on the area in which he operates his business. The regulatory framework of various countries could favour or hinder the activities of eco-entrepreneurs. Moreover, in some European markets, consumers may have reached a higher level of environmental awareness than in Italy today. As well as investigating the role of eco-entrepreneurship in other industries and sectors. Future studies could also conduct a longitudinal analysis to emphasise the crucial steps eco-entrepreneurs must take to ensure their business growth, perhaps highlighting evolutionary stages of increasing commitment towards sustainability, moving from initiatives that do not require significant commitments and investments to much more costly and demanding sustainable initiatives and practices. Detailed studies that assess contextual differences and inform targeted policy actions are essential for the greater effectiveness of eco-entrepreneurship initiatives.*

Managerial implications. *The study offers several managerial implications as it outlines several valuable pointers for tourism managers of small accommodation establishments on conveying their commitment to sustainability and society externally. By communicating within and outside the organisation, their responsibility and sensitivity to environmental issues, eco-entrepreneurs can achieve greater involvement of both their staff and their consumers, facilitating the pursuit of a common goal. One aspect that emerges as crucial is precisely that of educating consumers to adopt responsible practices even during a vacation, or educating employees in enacting all those behaviours aimed at preserving valuable natural land resources. Thus, the research provides useful insights into how such eco-business initiatives can help advance broader goals of sustainable tourism development. The role of policymakers is essential in fostering a uniform and cohesive regulation apt to unify the efforts of the realities, making it a shared commitment of the whole community, lowering the difficulties and obstacles related to complex regulation. The complexity of certification procedures and the large investments required represent a significant challenge for companies with green motivation but limited resources in terms of finance and personnel. In addition to potential difficulties, the study highlights how the strong motivations of eco-entrepreneurs could also help in the formation and sharing of a "green" entrepreneurial culture that will expand over time. The lack of such a widespread green culture in society is often overcome by compliance with environmental certification requirements, which guide entrepreneurs in making strategic decisions and taking concrete actions that lead them to transform their businesses into green businesses.*

Originality of the paper. *This study proves to be profoundly original in that it contributes to the development and enrichment of the literature on tourism eco-entrepreneurship, not from the perspective of the public, widely debated in the literature, but by exploring this phenomenon from the perspective of the entrepreneurial figure and organisations. In particular, the study focuses on the existence of the eco-entrepreneur in Italian hospitality and the identification of its characteristic traits. The study focuses on the Italian hospitality industry, deeply characterised by substantial tourist flows and small-medium hotel realities, often family-run, which might be particularly disadvantaged compared to significant realities due to scarce skills, limited financial resources and ancient facilities at their disposal. However, with their small size, such businesses prove nimble and flexible in adopting new environmental practices that can better follow the latest market trends and the pressures of the community and society in which they reside. These realities, precisely because of their history, competitiveness and structure, could represent valid examples for large tourist organisations in the hospitality sector.*

Key words: *eco-entrepreneur; sustainable tourism; green hospitality; small business; multiple case studies; Italy*

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Sharing economy e ospitalità: sfida o opportunità? Analisi del rapporto di sostituibilità tra imprese alberghiere e affitti brevi

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Abstract
Negli ultimi decenni, la sharing economy ha acquisito un ruolo sempre più rilevante all'interno del sistema economico tradizionale, favorendo la condivisione di beni e servizi attraverso piattaforme online. La diffusione di questo modello ha avuto un impatto significativo sul settore turistico, introducendo nuove dinamiche competitive e alimentando il dibattito sull'esistenza di un effetto di sostituzione tra le strutture alberghiere tradizionali e gli alloggi in affitto gestiti in forma imprenditoriale. Il presente studio analizza proprio questo fenomeno nell'area del Lago di Como, dove si è registrata una crescita di queste strutture ricettive in modo piuttosto rilevante nel corso dell'ultimo decennio. In particolare, l'obiettivo è identificare le categorie alberghiere maggiormente influenzate dalla concorrenza degli affitti a breve termine e individuare i principali fattori che guidano la scelta dei turisti tra queste due tipologie di sistemazione.
Dal punto di vista metodologico, l'indagine è stata avviata attraverso la somministrazione di un questionario a un campione di 104 individui. I risultati evidenziano la presenza di un effetto di sostituzione limitato alle strutture alberghiere di fascia medio-bassa. Inoltre, emergono come fattori chiave di attrattività degli affitti a breve termine la convenienza economica e la posizione strategica, sottolineando la necessità per alcuni operatori alberghieri di adottare strategie di differenziazione mirate.

Framing of the research. *Negli ultimi due decenni, la sharing economy ha trasformato profondamente il modo in cui beni e servizi vengono prodotti, distribuiti e consumati (Botsman e Rogers, 2010). Seppur rappresenti una pratica nata nel passato, la sharing economy è diventata più recentemente, grazie allo sviluppo delle nuove tecnologie (Buhalis e Law, 2008; Buhalis e Leung 2018), un modello di business particolarmente sviluppato in vari settori (Belk, 2014), incluso il turismo (Tussyadiah e Pesonen, 2016). In particolare, lo sviluppo di piattaforme online quali Online Travel Agencies (OTAs) e meta search websites (Toh et al. 2011) hanno modificato la struttura della distribuzione turistica con particolare riferimento all'offerta di alloggi turistici, anche non alberghieri, aumentandone l'accessibilità e la visibilità (Minazzi 2017; Mauri et al., 2018; Eurostat, 2024), nonché generando nuove dinamiche competitive. Nello specifico settore dell'ospitalità, alcuni studi dimostrano che uno dei prevalenti operatori della sharing economy, Airbnb, rappresenta un concorrente soprattutto per gli hotel di fascia medio-bassa (Zervas et al., 2017; Guttentag e Smith, 2017). Inoltre, alcuni studi dimostrano che gli host che rientrano nella sfera dei professionisti (professional hosts), ossia con più di una proprietà, competono direttamente con le imprese alberghiere e necessitano in tal caso di una regolamentazione specifica rispetto ai non-professional hosts (Marchi e Parekh, 2015). Si può affermare dunque che può esistere un rapporto di sostituibilità tra operatori della sharing economy e ospitalità alberghiera (Mody et al., 2017).*

Nonostante la condivisione (intesa come l'uso, l'occupazione o il godimento congiunto di risorse), abbia radici antiche (Schor e Fitzmaurice, 2015), essa è diventata oggetto di dibattito solo a partire dalla seconda metà del XX secolo, raggiungendo la sua massima crescita (intesa come numero di pubblicazioni scientifiche sul tema) nel 2017. Da allora, la sua espansione è stata continua e si prevede che proseguirà nei prossimi anni (Hossain, 2020). Nonostante la copiosa letteratura dedicata alla sharing economy (Botsman e Rogers, 2010; John, 2013; Richardson, 2015; Cheng, 2016; Basselier et al., 2018; Birinci et al., 2018; Yeganeh, 2021), la sua definizione rimane oggetto di dibattito in ambito accademico. Trovarne una condivisa risulta, infatti, particolarmente complesso vista la dinamicità del concetto e la varietà degli attori coinvolti (Herbert e Collin-Lachaud, 2017). Tuttavia, mediante un'analisi comparativa delle varie definizioni proposte dalla letteratura si notano alcuni punti in comune: l'uso di piattaforme online collaborative che agiscono da intermediarie, la presenza di beni o servizi condivisibili e il coinvolgimento di due parti, un fornitore e un consumatore. Anche se risulta difficile trovare una definizione condivisa da tutti gli studiosi, molti concordano su quella di Muñoz e Cohen (2016: p 21), che definisce la sharing economy come "a socio-economic system enabling an

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intermediated set of exchanges of goods and services between individuals and organizations which aim to increase efficiency and optimization of sub-utilized resources in society."

Se ci concentriamo sul settore turistico-ricettivo l'espansione incontrollata di alloggi turistici, però, specialmente nelle zone residenziali, ha sollevato numerose preoccupazioni in diversi paesi, soprattutto nelle maggiori destinazioni turistiche a causa dell'impatto che questo fenomeno può avere sul territorio con particolare riferimento al tema della sostenibilità (Martin, 2016). Si pensi al fenomeno dell'overtourism (Peeters et al., 2018; Nunkoo et al., 2019). In particolare, l'ascesa di piattaforme come Airbnb ha scosso l'industria ricettiva tradizionale, generando un contesto competitivo che minaccia la stabilità economica delle strutture alberghiere più tradizionali. L'impatto di tale fenomeno è stato oggetto di vari studi, i cui risultati, tuttavia, non sono univoci: mentre alcuni autori hanno evidenziato un marcato effetto di sostituzione tra Airbnb e le strutture alberghiere tradizionali (Zervas et al., 2017; Neeser, 2015; Dogru et al., 2020), altri sostengono che tale sostituibilità è limitata a specifiche categorie di hotel (Guttentag e Smith, 2017; Lin et al., 2024). Alcuni studi, invece, negano l'esistenza di una competizione significativa tra i due settori (Choi et al., 2015; Qiu et al., 2020).

Un ulteriore interessante aspetto di indagine è rappresentato dalla percezione del turista, indagando il suo processo di scelta del servizio turistico per comprendere le ragioni che spingono i turisti a preferire formule di sharing economy. In letteratura, vari studi analizzano le motivazioni dei turisti che conducono alla scelta di formule di sharing economy (Davidson et al., 2018, Hossain, 2020). Le principali sono: il vantaggio economico (prezzo), la maggiore flessibilità, l'autenticità dell'esperienza e un maggior senso di comunità rispetto alle formule tradizionali (Guttentag, 2016, Tussyadiah e Pesonen, 2016). Nowak et al. (2015) effettuano uno studio su utenti di Airbnb negli Stati Uniti ed Europa e identifica i cinque seguenti fattori determinanti la scelta di tale servizio: il prezzo competitivo, la posizione, l'esperienza autentica, la disponibilità all'interno dell'alloggio di una cucina e l'unicità dell'alloggio stesso. Anche se l'aspetto di convenienza economica risulta prevalente (Murillo et al. 2017) anche l'aspetto sociale, ossia entrare in contatto con persone nuove, ricopre per alcuni studi un certo ruolo (Liang et al. 2017).

Purpose of the paper. *Il presente studio analizza l'intensità del rapporto di sostituibilità esistente fra imprese alberghiere e alloggi gestiti in forma imprenditoriale (case vacanza, affitti brevi) rese più accessibili dai portali di sharing economy. Risulta interessante comprendere quali siano le categorie alberghiere maggiormente colpite dal fenomeno. Inoltre, l'analisi si concentra anche sulla percezione del turista, indagando il suo processo di scelta del servizio turistico. In particolare, il paper si propone di studiare i criteri e i fattori che influenzano il comportamento dei turisti tra la scelta di alloggi in affitto gestiti in forma imprenditoriale e strutture alberghiere tradizionali. L'analisi si propone di contribuire alla letteratura sul tema della sharing economy che, seppur presenta un numero elevato di pubblicazioni, ancora rileva un certo dibattito soprattutto sul tema del rapporto e della competizione con le strutture di accommodation più tradizionali. Parallelamente, la ricerca mira a fornire una migliore comprensione dei vantaggi competitivi che caratterizzano le piattaforme di sharing economy nel settore turistico. In particolare, dopo aver analizzato la letteratura legata al fenomeno della sharing economy nel settore turistico e l'evoluzione degli affitti turistici a breve termine, si discuteranno i risultati dell'indagine svolta sul campo relativa alle scelte dei turisti.*

Come contesto di applicazione e di analisi di questo studio è stata selezionata l'area del Lago di Como, in quanto rappresenta un caso particolarmente interessante per l'esame delle dinamiche competitive nel settore turistico. L'analisi dei dati ISTAT evidenzia un andamento crescente nel numero di strutture ricettive nell'area nel 2023, che mostrano una crescita del 124,65%, passando da 1.002 (2013) a ben 2.251 (2023) trainate dall'aumento degli affitti brevi. Infatti, un'analisi più dettagliata dei dati mostra una dinamica differente per hotel e case vacanza (affitti brevi): se da un lato tra il 2013 e il 2023 si è registrata una diminuzione degli hotel presenti sul territorio (-23%), dall'altro si è assisto a una crescita significativa dei cosiddetti affitti brevi (+893.88%).

Alla luce di quanto precedentemente illustrato, il paper si propone quindi di indagare le seguenti domande di ricerca:

***RQ1**: In quale misura è possibile identificare un effetto di sostituzione tra le strutture ricettive alberghiere tradizionali e gli alloggi in affitto gestiti in formula imprenditoriale (case vacanza, affitti brevi), analizzando le preferenze espresse dalla domanda turistica?*

***RQ2**: Quali segmenti specifici del comparto alberghiero risultano maggiormente interessati al fenomeno di sostituzione?*

***RQ3**: Quali motivazioni influenzano significativamente la propensione dei consumatori a selezionare sistemazioni alternative rispetto all'offerta alberghiera convenzionale?*

Methodology. *L'indagine è stata condotta mediante la somministrazione di un questionario rivolto a turisti che nel periodo di riferimento (12 maggio - 31 agosto 2024) hanno soggiornato in alloggi gestiti in forma imprenditoriale nell'area del Lago di Como. Questo metodo di ricerca rappresenta uno strumento utile per l'analisi dei problemi sociali ed è stato ampiamente utilizzato in studi precedenti (Valli, 2017). Il questionario è stato diffuso attraverso una combinazione di codici QR e copie cartacee, anche grazie all'aiuto di host della zona, associazioni di guide turistiche e uffici di informazione turistica (InfoPoints) nei principali centri attorno al lago e presso i terminal dei traghetti. Inoltre, i questionari sono stati consegnati direttamente ai turisti in luoghi di interesse strategici. I dati raccolti sono stati analizzati utilizzando metodi di statistica descrittiva, allo scopo di ottenere una chiara rappresentazione del profilo dei*

rispondenti. Questo approccio permette di esaminare in dettaglio le caratteristiche sociodemografiche e comportamentali dei partecipanti, fornendo una base solida per ulteriori analisi volte a comprendere meglio il fenomeno.

Il questionario è composto da quattro sezioni. La prima parte è dedicata all'analisi delle caratteristiche sociodemografiche dei partecipanti allo scopo di delinearne il profilo. La seconda sezione è focalizzata sull'analisi del comportamento di viaggio del campione, partendo da domande di carattere generale relative alle abitudini di viaggio e concludendo con domande più specifiche riguardanti la vacanza in corso al momento della compilazione. La terza parte, invece, è mirata a comprendere in modo più approfondito la percezione dei turisti riguardo all'esistenza di una potenziale sostituibilità tra le strutture alberghiere tradizionali e le opzioni di alloggio non alberghiere. La quarta ed ultima sezione dell'indagine è stata concepita con l'obiettivo di identificare i fattori che hanno maggiormente influenzato la decisione finale dei turisti nella scelta della struttura di alloggio. Tale analisi ha permesso di individuare i fattori competitivi che favoriscono la scelta di Airbnb rispetto agli hotel tradizionali. Al tal fine è stata impiegata una scala di motivazioni composta da 15 elementi, articolati in 5 dimensioni teoriche: prezzo, attributi funzionali, autenticità e unicità locale, novità, ed ethos della sharing economy (Guttentag, 2016). La valutazione di ciascun elemento è stata condotta tramite una scala Likert a cinque punti, dove 1 indicava "Fortemente in disaccordo" e 5 "Fortemente d'accordo".

Results. *Il questionario proposto è stato completato da un totale di 104 partecipanti (54 di uomini e 50 donne). Il campione è composto, per circa la metà dei partecipanti, da soggetti con un'età compresa tra i 19 e i 29 anni e, per la restante parte, in prevalenza da turisti fino ai 49 anni. Considerando il grado di istruzione si evince che il 44% è almeno laureato triennale. Inoltre, una porzione significativa dei partecipanti (75%) risulta occupata e, passando al livello di reddito dichiarato, emerge che 58 rispondenti (55%) hanno dichiarato un valore superiore a 30.000€ annui. Si tratta di un turista con motivazione prevalentemente leisure (90%) che proviene principalmente dalla Germania (15%), Francia e Paesi Bassi (12%) e Italia (11%)[5]. La maggior parte viaggia in compagnia (coppia il 60% e amici il 25%) e si trattiene presso la località per 2 o 3 notti (50%). Buona parte degli intervistati afferma di utilizzare frequentemente Airbnb nelle proprie scelte di viaggio (34% da 1 a 3 volte, 26% da 4 a 6) e 23% oltre 10.*

Con riferimento all'analisi della pianificazione del loro soggiorno, la maggioranza dei partecipanti ha dichiarato di aver preso in considerazione simultaneamente sia strutture alberghiere che extra-alberghiere, mentre solo il 28% si è concentrato esclusivamente sulla seconda categoria. Per rispondere alla RQ1 è stato richiesto agli intervistati di valutare su una scala Likert da 1 a 5 il livello di intercambiabilità percepita tra strutture alberghiere e alloggi gestiti in forma imprenditoriale, come Airbnb. Inoltre, è stato loro chiesto di indicare quale sarebbe stata la loro scelta di alloggio più probabile in assenza alloggi presenti su Airbnb e servizi analoghi nella zona (RQ2). Come si può osservare nella seguente tabella (Tabella 1), è possibile identificare un certo grado di sostituibilità tra le due alternative poiché la maggioranza delle risposte si è concentrata tra 3 e 5, con una forte predominanza del 4 (circa il 43%).

Tab. 1: Effetto sostituzione nella scelta dell'alloggio

Caratteristiche	%	n
Durante il processo di prenotazione hai considerato…		
Sia hotel che sistemazioni non alberghiere	72,12%	75
Solo sistemazioni non alberghiere	27,89%	29
Grado di sostituzione tra Airbnb e hotel		
1 basso	0,96%	1
2	6,73%	7
3	28,85%	30
4	42,31%	44
5 alto	19,23%	20
Scelta di alloggio più probabile se Airbnb e altri servizi simili non esistessero		
Non avrei fatto il viaggio	0,96%	1
Amici o familiari	0,96%	1
Ostello	5,77%	6
B&B	21,15%	22
Hotel economici	33,65%	35
Hotel di media categoria	31,73%	33
Hotel di alta categoria	0,96%	1
Hotel di lusso	2,88%	3

Circa due terzi dei partecipanti ha dichiarato che in assenza di Airbnb o simili, avrebbe scelto una struttura alberghiera in sostituzione, in particolare un budget hotel e un hotel di fascia media (2-3 stelle). Il 21,15% degli intervistati avrebbe invece comunque considerato i Bed & Breakfast come potenziale alternativa, rendendoli la terza scelta più popolare. In conclusione, i risultati di questa prima parte di studio suggeriscono che, secondo la percezione dei turisti, esiste un grado di sostituibilità parziale tra strutture alberghiere e affitti a breve termine (RQ1) e che tale sostituibilità risulta più accentuata per le strutture di fascia medio-bassa (RQ2).

[5] Sono inoltre presenti rispondenti da altri 22 paesi, tra i quali Gran Bretagna, Stati Uniti, Polonia e Belgio.

Infine, sono state indagate le motivazioni che conducono il turista a scegliere una formula di alloggio come la casa vacanza e l'affitto breve. La motivazione prevalente risulta essere legata alla convenienza economica (3,89) seguita dalla posizione (3,73) e dalla flessibilità dell'offerta (3,5). Anche l'accesso ai servizi domestici e la disponibilità di maggiore spazio sono stati considerati elementi importanti nella scelta dell'alloggio, invece l'"atmosfera familiare" offerta dagli affitti a breve termine ha esercitato un'influenza minore sul processo decisionale, con una distribuzione equilibrata delle risposte tra disaccordo, neutralità e accordo. Anche l'interazione con l'host, ossia la possibilità di ricevere informazioni e consigli utili, ha esercitato minore importanza sulle scelte dei partecipanti. Questo si collega anche alla ricerca di autenticità, sia nelle esperienze da vivere che nella possibilità di interagire con la popolazione locale, che ha esercitato un'influenza limitata sulle scelte dei partecipanti con un punteggio medio di 3,08 su 5.

Non risultano quindi particolarmente rilevanti per i turisti intervistati le dimensioni relative alle esperienze e alla possibilità di avere una maggiore personalizzazione del soggiorno. Un ultimo aspetto analizzato è la sostenibilità della sharing economy che non si è dimostrato un fattore rilevante nella scelta dei partecipanti di Airbnb rispetto agli hotel tradizionali. Infine, un fattore emerso dai rispondenti è l'apprezzamento dei turisti nei confronti delle informazioni aggregate fornite da Airbnb, che riescono in modo grafico e immediato a dare una panoramica completa dell'alloggio scelto o desiderato.

Possiamo quindi concludere che il turista leisure che visita il Lago di Como, con particolare riferimento ai giovani adulti con un livello alto di istruzione, sceglie Airbnb prevalentemente per la sua convenienza economica, seguita dalla flessibilità e dall'ampiezza dell'offerta e dalla posizione strategica dei suoi alloggi. Al contrario, fattori quali l'innovatività della piattaforma, i suoi valori fondanti quali l'autenticità, l'interazione con la comunità locale e il suo minore impatto ambientale non hanno esercitato un'influenza significativa sulle scelte dei turisti, confermando in parte quanto affermato da ricerche precedenti (RQ3). Si conferma un rapporto di sostituibilità fra imprese alberghiere tradizionali e affitti brevi (RQ1) specialmente per le strutture economiche e di fascia medio-bassa (RQ2).

Research limitations. *Il presente studio presenta alcune limitazioni metodologiche. In primo luogo, l'analisi si trova ancora in una fase esplorativa. Le principali criticità riguardano la numerosità del campione e l'ambito geografico della raccolta dati, circoscritto alla regione del Lago di Como. Tale delimitazione territoriale, sebbene permetta un'analisi approfondita del contesto locale, impedisce una generalizzazione dei risultati a scale più ampie. Per il futuro l'obiettivo sarà quello di estendere la somministrazione del questionario a livello nazionale e internazionale per poter avere una base dati più corposa. Grazie a questo sarà possibile anche implementare metodologie più sofisticate di analisi statistica inferenziale che consentiranno di elaborare i dati raccolti con maggiore precisione e di individuare correlazioni significative tra le variabili esaminate.*

Managerial implications. *I risultati dello studio presentano rilevanti implicazioni manageriali per i gestori delle imprese alberghiere e per i gestori degli alloggi turistici, nonché per gli altri operatori delle destinazioni turistiche. Comprendere l'entità della competizione esistente con le strutture ricettive non tradizionali risulta di particolare importanza, in particolare per identificare quali siano le categorie alberghiere più esposte a tale rischio: così facendo sarà possibile sviluppare adeguate strategie di differenziazione, cercando di valorizzare i propri elementi distintivi allo scopo di acquisire nuovi potenziali clienti, specialmente coloro che manifestano interesse per entrambe le tipologie di alloggi. I gestori degli alloggi vacanza in affitto possono trarre spunto per comprendere come cercare di sviluppare la clientela potenziale per il futuro. Inoltre, tenendo in considerazione la rapida diffusione degli affitti a breve termine, e gli impatti che questi possono avere sulla destinazione (si pensi per esempio all'overtourism) la presente ricerca sottolinea anche l'importanza di una maggiore regolamentazione a livello distrettuale. Se la motivazione del turista è legata ai minori costi rispetto che alla ricerca di autenticità e di rapporto con la comunità viene meno l'idea iniziale della sharing economy e si apre la strada ai professional hosts che a maggiore ragione si pongono in competizione con le strutture ricettive a tutti i livelli. La cooperazione e il dialogo tra le amministrazioni comunali, le associazioni di categoria del settore alberghiero e degli host di affitti a breve termine si configurano come elementi cruciali per l'elaborazione di normative efficaci e la gestione delle potenziali problematiche derivanti dalla complessa interazione di interessi e libertà coinvolti. In tali riflessioni sono coinvolti tutti gli stakeholder del territorio (es. trasporto, attrazioni) che possono utilizzare queste informazioni per orientare le proprie politiche di sviluppo.*

Originality of the paper. *Lo studio contribuisce agli studi sul tema della sharing economy con particolare riferimento al rapporto di sostituibilità e quindi alle dinamiche competitive esistenti fra imprese alberghiere tradizionali e alloggi gestiti in forma imprenditoriale (affitti brevi). Anche se la letteratura scientifica sul tema della sharing economy è particolarmente corposa, questo argomento risulta ancora molto dibattuto e presenta risultati contrastanti. Risulta quindi utile continuare nello studio del fenomeno per comprenderlo al meglio e offrire maggiori strumenti ai manager del settore turistico. In particolare, lo studio conferma gli studi di Zervas et al. (2017), Neeser (2015) e Dogru et al. (2020), che sostengono l'esistenza di un forte rapporto di sostituibilità fra hotel e alloggi vacanza in affitto, con particolare riferimento a specifiche categorie di hotel (Guttentag e Smith, 2017; Lin et al., 2024) di fascia media ed economica. Infine, rispetto ad altri studi, il presente lavoro si concentra sull'analisi diretta del processo di scelta del turista, analizzandone anche le motivazioni che portano alla scelta di Airbnb. I risultati supportano alcuni studi che avevano rilevato il vantaggio economico e la flessibilità dell'offerta (Guttentag 2016, Tussyadiah e Pesonen, 2016 Murillo et al. 2017) come importanti fattori di scelta di Airbnb. Non sono invece ritenute importanti altre motivazioni legate all'autenticità dell'esperienza, alla interazione con la comunità locale e, in generale, all'aspetto sociale che invece riscontrato da altri autori (Liang et al. 2017).*

Key words: *sharing economy; hotel; hospitality; effetto di sostituzione; affitti brevi.*

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Exploring change in tourism systems: a qualitative study on hospitality operators and the new Salerno airport's impact on destination management

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Abstract

Changes in destination accessibility can trigger shifts in a tourism system, requiring management strategies and strategic alliances to turn these changes into competitive assets. Such changes may pose challenges without proper management, negatively affecting a destination's attractiveness. This paper adopts a case study approach to examine tourism system change following the opening of Salerno Costa D'Amalfi Airport in July 2024. This event marks an opportunity to enhance the destination's appeal and strengthen its economic base. While Salerno has traditionally been secondary to renowned neighbouring destinations like Naples and the Amalfi Coast, the new airport infrastructure offers a chance to redefine its competitive positioning in regional and international markets. However, this change also affects tourism employment, services, and seasonality. This study will explore hospitality owners, managers and hosts' perceptions of change through the theoretical lens of the tourism competitiveness six A's framework. Preliminary findings suggest that stakeholders perceive improved accessibility as a first step towards an ecosystem change that can tackle urgent issues such as seasonality, low levels of stable tourism employment, and overdependence on specific tourism segments. Indeed, the new airport could lead to a new network of services benefiting tourists and residents and turn Salerno into a hub for tourists and neighbouring regions suffering from accessibility issues. The new airport could enhance Salerno's attractiveness to new tourism segments such as sports and business tourism if guided by new amenities and ancillary services like working spaces, fairs, exhibitions, and cultural and business events. However, findings suggest that it is crucial to have a proper inclusive tourism strategy guided by tourism stakeholders capable of identifying the most suitable strategies to pursue based on the territory's main challenges. Without the involvement of local tourism stakeholders, there is the risk of encountering challenges that affect the tourism ecosystem, such as a deregulated increase in tourism accommodation, a lack of intermodal connectivity and the development of attractions that do not value the local culture and economy.

Framing of the research. *Tourism destinations' competitiveness relies on many factors to enhance their attractiveness. Accessibility in terms of transportation to the destination (Buhalis, 2000) is a key component that influences destination management strategies (Campa et al., 2016; Cavallaro et al., 2020). Being destinations part of tourism systems (Moreira et al., 2021), changes to the accessibility of a destination may have implications for a wide array of stakeholders inside and outside the tourism system. Therefore, changes in destination accessibility need proactive and strategic management (McLoughlin et al., 2023) to avoid challenges related to a deregulated increase in tourism flows that can damage destination resources and inhabitants (Tsaur et al., 2018). Indeed, suppose tourism is considered a mere economic activity. In that case, it becomes difficult to address the sector's current and potential impact on resources, infrastructures and inhabitants, which have social, economic and environmental implications (Postma et al., 2017). Indeed, many destinations suffer from tourism because of poor management, aggravating existing challenges (Tsaur et al., 2018; Aall & Koens, 2019; Adie et al., 2020; Escobar & Margherita, 2024). To this end, Gil-Garcia et al. (2015) report the need for "intergovernmental, interagency, and inter-sectoral networks" to collaborate among multiple actors of a tourism system.*

To analyse local stakeholders' perception of the infrastructural changes to the destination's accessibility, this study will adopt the six A framework as a lens (Figure 1).

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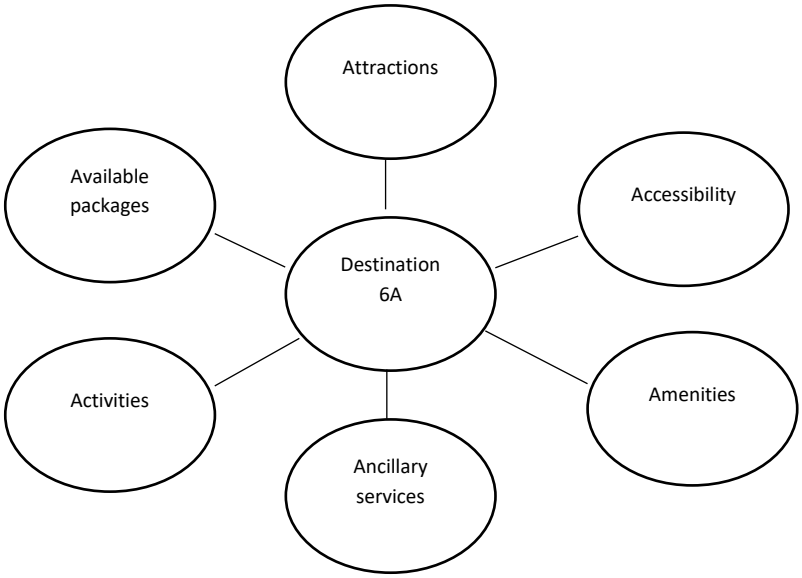
Fig. 1: Six A's of a Destination (based on Buhalis, 2000)



This framework describes destination structure as having six components (Buhalis, 2000; Neuhofer et al., 2012; Boes et al., 2016; Başer et al., 2019; Lee et al., 2020): (1) Attractions, which can be natural (e.g., mountains), artificial (e.g., amusement parks), or cultural (e.g., music festivals); (2) Accessibility, referring to the entire transportation network within the destination, including available routes, existing terminals, and sufficient public transportation options; (3) Amenities, which encompass all services that ensure a comfortable stay, such as accommodation, dining, and recreational activities; (4) Available packages, which are service bundles offered by intermediaries to highlight specific unique features of a destination; (5) Activities, which include all available experiences at the destination that primarily attract tourists; and (6) Ancillary services, which refer to everyday services not explicitly intended for tourists, like banks, postal services, and hospitals. To enhance destination competitiveness, it is essential for destinations to integrate all stakeholders in a collaborative co-creation process.

Purpose of the paper. *This study will explore the implications for destination competitiveness of changes in destination accessibility through the case of the newly developed Salerno Costa D'Amalfi Airport (opened in July 2024) to unveil the perceived impact of this change on the local tourism industry. Guided by this purpose, we aim to answer the following research questions:*

RQ1 What are the perceptions of hospitality owners, managers and hosts regarding the impact of the new Salerno airport on the city's tourism potential?

Methodology. This *study adopts an exploratory qualitative research design to investigate the impact of the opening of the Salerno Costa D'Amalfi Airport on the city of Salerno as a tourist destination from the perspective of hospitality owners, managers and hosts. This research will focus on the subjective experiences and perspectives of this segment of the tourism ecosystem. Qualitative research is particularly suited for exploring the complexity of social phenomena, such as destination management and tourism development, where quantitative approaches may fail to capture underlying motivations, perceptions, and the nuances of interpersonal and community dynamics (Creswell, 2016).*

To comprehensively understand the multifaceted impacts of the airport, the study will employ semi-structured interviews as its primary data collection method, and the participants will be chosen through convenience sampling (Etikan et al., 2016). Such interviews will effectively uncover personal motivations, perceptions of change, and anticipated consequences related to the airport's development. In terms of sampling, this working paper includes interviews to 15 respondents. However, this sample will be further expanded to ensure data saturation. Interviews were conducted online and were analysed through content analysis.

The qualitative approach captures the intricate motivations, perceptions, and interpersonal dynamics that quantitative methods might overlook. Ultimately, this research aims to contribute to a deeper understanding of how changes in a tourism system in the form of infrastructural developments influence a destination's economic trajectory and social landscape.

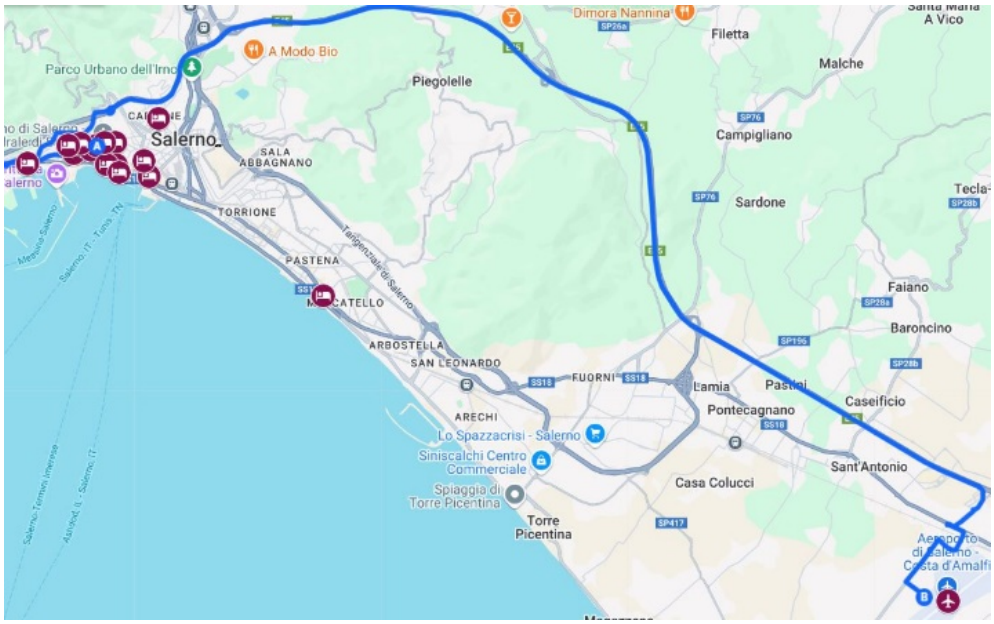
Results. *We conducted fifteen semi-structured interviews (Table 1) with local tourism stakeholders of Salerno.*

Tab. 1: Interviewees information

	Interviewee	*Type of tourism accommodation*	*Years of experience in the tourism industry*	*Role*
1	*Petite Maison Salerno*	*Guesthouse*	*2*	*Host*
2	*Home47*	*Bed & Breakfast*	*10*	*Host*
3	*Il Soffione Home* *Il Soffione centro storico*	*Bed & Breakfast and Guesthouse*	*7*	*Owner and Manager*
4	*Gli Archi dei Diavoli*	*Bed & Breakfast*	*5*	*Owner and Manager*
5	*VelAmare*	*Bed & Breakfast*	*9*	*Owner and Manager*
6	*Le Petit Bougainville/* *La Maison Bouganville*	*Guest house*	*11*	*Owner and Manager*
7	*Casa Vacanza il Duomo*	*Guesthouse*	*18*	*Host*
8	*Salerno Sea View*	*Bed & Breakfast*	*10*	*Owner and Manager*
9	*B&B Les Lumières*	*Bed and Breakfast*	*3*	*Owner and Manager*
10	*B&B Portanova*	*Bed & Breakfast*	*7*	*Owner and Manager*
11	*B&B Il Campanile*	*Bed & Breakfast*	*9*	*Owner and Manager*
12	*A Casa di Adri*	*Guesthouse*	*9*	*Owner and Manager*
13	*Qui si*	*Bed and Breakfast*	*4*	*Manager*
14	*Tyrrenium Salerno* *Dimora Francesca*	*Bed and Breakfast and Guesthouse*	*9*	*Owner and Manager*
15	*Santi e Saraceni rooms/* *La Suite della Principessa*	*Bed and Breakfast*	*3*	*Owner and Manager*

These tourism stakeholders are hospitality owners or managers of tourism accommodations (Bed &Breakfasts or Guesthouses) located in the city centre of Salerno or neighbouring smaller towns still part of Salerno (figure 1).

Fig. 1: The geographical positioning of the tourism accommodations included in this study and the new airport's location.



Preliminary results (summarised in Table 2) show that changes in destination accessibility can influence ecosystem changes: indeed, the boat and ferry services previously available only during high season remain open also in low season.

Tab. 2: Results summarised

Destination Dimension	*Before Airport*	*After Airport*
Accessibility	*Seasonal transportation*	*Intermodal year-round services which benefit both tourists and residents.*
Amenities	*Seasonal amenities*	*Tourism stakeholders also offer services during the low season that benefit tourists and residents.*
Attractions, activities and available packages	*The main attraction is "Luci d'Artista", visited mainly by residents and domestic tourists*	*In addition to "Luci d'Artista", other cultural attractions are being developed around the main event to offer a more integrated tourism offer.*
Ancillary services	*Ancillary services available for the population*	*With an increase in tourism flows and activities present at the destination, the need for new integrated ancillary services might arise to satisfy the demands of a higher temporary and permanent population.*

With an increase in tourism flow, there might be a need for new integrated ancillary services (Buhalis, 2000) to satisfy the demands of a higher temporary and permanent population. In addition, potential changes in tourism flow might lead to planning to expand the offer of attractions, packages and activities in terms of cultural events to offer tourists an enhanced experience.

Yet, the hosts interviewed considered that these changes would happen only through a cohesive strategy that must be guided by the DMO in a joint effort with municipalities and with the involvement of the tourism ecosystem. Indeed, all hosts interviewed in this research reported that the news about the opening of Salerno airport was retrieved from newspaper articles or social media, as there were no communications from the municipality regarding the project development and opening date. Therefore, hosts had to rapidly adjust their services to the new opening regarding the information provided to tourists and a new rise in tourism offers that leads to higher competition.

The city of Salerno is at a turning point in its tourism development thanks to the airport infrastructure, but is also facing challenges related to seasonality and competition with nearby, more established destinations.

Given the new accessibility and the city's strategic location, between the Amalfi Coast and Naples, the mice and business tourism segment may choose Salerno as a base for business retreats, remote work, fairs, and events.

In terms of attractions, interviewee 3 states, "attractions will potentially be planned for a bigger audience in terms of tourism segments, consequently increasing the number of attractions for a bigger market". Attractions in the destination will likely need to change both in terms of the quantity of attractions available for tourists and in terms of quality. Indeed, as explained by interviewee 5, "Salerno needs first to assess its value as a tourist city before building new attractions, as this can influence the quality of the attractions developed". Some attractions are already being developed: according to interviewee 2, "there are already projects for the improvements of beaches in the area of Torrione that can make those beaches a new attraction for Salerno and possibly boost beach tourism". Therefore, the development of the new airport could potentially contribute to identifying new attractions that can satisfy a larger and possibly more diversified tourism demand and be a tool for improving and revitalising current attractions. Indeed, interviewee 6 explains that "since the airport, some attractions like local markets by the seaside of local artisans, chocolate festival were restored" but also "it is the first time that the municipality brings to Salerno a famous painting for a temporary art exhibition which is important because the city has a very low amount of art exhibits". In addition, interviewee 2 stresses that "a greater tourist influx could encourage investments in cultural events and festivals, strengthening initiatives such as Luci d'Artista and Salerno Letteratura, making the city more attractive".

In terms of amenities, interviewees report that since the airport, there has been a dramatic increase in the number of amenities available for tourists in different parts of the city of Salerno, with the highest increase in the area of the airport that has been revitalised. The kind of accommodations is also changing, indeed, as explained by interviewee 3, many new tourism accommodations have as their target tourism segment couples and one-night guests. However, this sudden increase in tourism accommodations led to challenges in the tourism ecosystem of Salerno as expressed by interviewee 6 "They have opened so many B&Bs and holiday rentals that competition is fierce. In the low season, it is difficult to have guests, before you had a few more guests, now you don't". Therefore, the development of the airport led to challenges for the current tourism system. In terms of other services, interviewees reported that since the airport's opening, previously nonexistent services, such as luggage storage facilities, have now been available in the city. Indeed, interviewee 6 explains how "before the airport, apps like radical storage had very limited coverage".

With regards to the available packages, the perception of how the airport might be influencing and will influence the available packages at the destinations raises a main concern among the interviewees that relates to the capacity of Salerno to receive and manage new tourism flow as it is considered a crucial factor that can influence the development and success of new packages at the destination. Indeed, as explained by interviewee 4, "packages have been available in Salerno for some time now but very limited to a specific high-end tourism segment" and therefore, the development of new packages depends on the ability of Salerno to develop a cohesive tourism strategy that maps current and potential areas of tourism attractiveness. Particularly, Salerno needs to analyse which kind of tourism experiences are present in the destination and how these experiences can be connected to offer packages to tourists landing at Salerno Airport. Indeed, a wider offer, according to interviewees, can secure Salerno as a tourist hub for the region.

Some new packages are already emerging, such as boat tours combined with gastronomic experiences and day visits to neighbouring destinations (e.g. Capri, Paestum). However, most interviewees consider that the development of packages is still in its infancy.

In terms of ancillary services, some changes have been reported by the interviewees since the opening of the airport: Interviewees 3 and 2 report that since the airport opening, there has been an increase in shopping malls, car rentals and car sharing. In addition, the interviewee added an increase in candy shops, street food, coffee shops that sell products for international customers, and ethnic restaurants. According to interviewees 5 and 8, ancillary services should increase, and the personnel should be trained to interact with international customers. This change should start with the municipality offering, for example, English courses for local business owners to overcome potential linguistic barriers and enhance the tourist experience. Finally, interviewees 3 and 9 suggest that major changes will more likely occur in 2027 with the opening of a multimodal transport station that will link the airport with Salerno's subway and high-speed trains. Indeed, the new infrastructural development will potentially help to boost the development of new shopping malls, co-working spaces, banks and clinics, given the new connectivity.

In terms of perceived changes in tourism activities since the airport opening, interviewees are hopeful that an increase in tourism flow will bring new tourism segments interested in a variety of activities such as sports tourism, business

tourism, which can increase business events, exhibitions and business fairs that could boost the local economy tackling seasonality. Yet, activities must be connected in terms of transportation and scheduling to enhance the overnight stays. However, interviewee 9 claims, "Something is moving due to the will of a few, but I don't see a structured system guiding the change, " showing the need for a cohesive tourism strategy to guide the ecosystem change. This is confirmed by interviewee 7, who states how the number and quality of activities "[…]will depend on the territory's ability to organise and offer quality experiences."

Finally, in terms of accessibility to the destination, Salerno has shown signs of improvement since the airport's opening. Indeed, interviewees 6 and 4 report that seasonal services such as ferries, which are a crucial means of transportation for tourists and locals to connect Salerno with the Amalfi Coast, this year stayed active during low season, which enhanced greatly the accessibility and interconnectedness of Salerno with neighbouring destinations that are famous tourist destinations such as Capri.

In addition, the airport connects Salerno with neighbouring regions such as Calabria and Basilicata, which lack transportation infrastructure. The connection with this region can open Salerno to become a hub for international tourists aiming to visit these regions suffering from low accessibility, as well as for domestic tourists from these regions. Finally, the intramodality of the new airport station will allow for enhanced accessibility to the destination and develop the touristic potential of neighbouring areas.

In conclusion, the new airport has the potential to boost Salerno's appeal to emerging tourism markets, including sports and business tourism, especially if supported by new facilities and complementary services such as co-working spaces, trade fairs, exhibitions, and cultural or corporate events. However, research highlights the need for a well-structured, inclusive tourism strategy led by industry stakeholders who can identify the most effective approaches based on the region's key challenges. Without the active participation of local tourism players, there is a risk of issues that could disrupt the tourism ecosystem, such as uncontrolled growth in accommodation facilities, inadequate intermodal connectivity, and the development of attractions that fail to enhance local culture and economy.

Research limitations. *This research comes with some limitations. Being a qualitative case study, the findings are not intended to be generalised but rather to provide an in-depth exploration of the specific context of the Salerno tourism system following the opening of the new airport. Future studies could expand the sample of cases to identify potential similarities and differences in how changes in destination accessibility impact tourism dynamics. This study focuses exclusively on the perspectives of hospitality operators, specifically bed & breakfast and guest house owners and managers. While their insights are valuable in assessing the direct effects on the hospitality sector, they represent only a subset of the broader tourism ecosystem. To develop a more comprehensive understanding of the implications of the airport's opening, future research should incorporate the perspectives of additional key local stakeholders, including policymakers, destination managers, travel agents, restaurateurs, and local entrepreneurs. Their insights could offer a deeper understanding of governance strategies, infrastructure challenges, and the wider economic and social impacts of increased accessibility. Expanding the range of stakeholders involved would facilitate a more holistic analysis of how infrastructural changes influence destination management and competitiveness, ultimately contributing to a more effective and sustainable approach to tourism development.*

Managerial implications. *Destination management organisations (DMOs) and city managers can use this study as a valuable tool to better understand strategic and proactive change management in tourism destinations. The findings highlight the crucial role of accessibility in shaping a destination's competitiveness and emphasise the need for coordinated efforts among various stakeholders to maximise the benefits of new infrastructure development. A key implication of this research is the importance of stakeholder involvement in strategic planning. The perspectives of hospitality stakeholders reveal that the lack of direct communication and coordination between local authorities and tourism businesses can hinder effective adaptation to infrastructural changes.*

In particular, it is necessary to actively involve hospitality operators in decision-making processes related to the competitive positioning of Salerno, which can now count on a new advantage linked to accessibility. The new airport opens up diverse tourist segments, such as business, sports and cultural tourism, that require tailored services and targeted value propositions. B&BS and holiday homes could rethink their offer by including co-working spaces, flexible check-in/check-out services for travelling professionals, or thematic stays linked to local events and festivals.

To make this transition effective, city managers should create structured dialogue platforms that facilitate continuous interaction between policymakers, tourism operators, transport providers and other key players in the local economy. This would enable more informed decision-making and the development of integrated strategies that align infrastructure improvements with sustainable tourism growth.

Increasing the intermodality and usability of the destination in the low season also makes it possible to create joint tourism packages. Hospitality operators should collaborate with transport providers and agencies to offer integrated packages, such as overnight stays + ferry tours, food and wine experiences or guided tours to neighbouring sites (e.g. Amalfi Coast, Paestum, Pompeii). This enriches the visitor experience and helps to lengthen the average stay and counteract seasonality.

The study also suggests that increased accessibility alone does not automatically translate into positive tourism development. DMOs and city managers must anticipate potential challenges, such as uncontrolled growth in accommodation supply, seasonal fluctuations in demand and the need to improve intermodal transport connections.

In this regard, we suggest the adoption of public policies that regulate the growth of short-term tourist rentals and promote quality standards for accommodation facilities. Training courses could be activated to improve the professionalism of operators, such as English language courses and seminars on digital marketing. Finally, creating a shared platform for real-time updates on infrastructural developments and tourist flows is recommended so that local operators can adapt their operational strategies on time.

Originality of the paper. *This research will contribute to the academic discourse on destination management by providing a real-world case study on the impact of new infrastructure in a medium-sized Italian city. In particular, it examines the initial effects of Salerno's Amalfi Coast Airport, newly opened and operational for less than a year, making this study one of the first academic contributions to explore its implications for the local tourism ecosystem. Preliminary findings offer valuable insights informing local policies and broader theoretical frameworks related to destination development, competitiveness, stakeholder collaboration, and tourism management. This study expands the current knowledge on the role of airports as facilitators of tourism ecosystem change that have been analysed with a more quantitative lens (Marchesani et al., 2023), providing a nuanced qualitative perspective. Indeed, by capturing the perspectives of hospitality operators at this early stage of infrastructural change, such as the opening of a new airport, the study sheds light on the immediate opportunities and challenges faced by the sector, providing a basis for future research on the long-term evolution of tourism dynamics in the area. This case study enriches the literature on accessibility and tourism by emphasising the importance of proactive and strategic management (McLoughlin & Hanrahan, 2023) to make the most of the benefits of new transport infrastructures. At the same time, it highlights the need to prevent potential risks, such as unregulated accommodation growth, and the risk of destination saturation and overtourism phenomena.*

Key words: *Destination Management; Accessibility; Change Management; Case Study; Destination competitiveness; Hospitality, Tourism Ecosystems*

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Action research on hotel guests' sustainable behaviour

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Abstract

This study explores the factors that influence four-star hotel guests' decisions regarding the utilisation of room cleaning services on a daily basis. Utilising the concept of 'warm-glow', this research investigates tourists' actual behaviour in a hotel setting. The investigation was conducted over an 18-month period and is underpinned by a rigorous evidence-based approach. The findings of this action research provide novel insights into the dynamics of leadership and front desk interactions, and their role in overcoming barriers to the success of the programme. The findings of this research, coupled with the outcomes of a binary logistic regression analysis, offer a comprehensive insight into the factors that influence tourists' decisions. These results can be utilised by hotel managers to seamlessly implement their own green programmes.

Framing of the research. *Hotels and other types of accommodation account for 2% of the 5% of global CO2 emissions from the tourism sector. Daily cleaning hotel rooms is one of the problems. It is estimated that estimated that daily room cleaning uses 'some 35 litres of water, 100 ml of chemicals, and 1.5 kWh of electricity in a four-star hotel (Knezevic-Cvelbar, Grün and Dolnicar, 2021). Management research has extensively examined the methods through which tourism enterprises adopt sustainability practices (Buffa et al., 2019). In the context of the hospitality industry, hotels have increasingly recognized the importance of implementing sustainable strategies to reduce their environmental impact. Notable approaches include energy-efficient technologies, waste reduction programs, and water conservation initiatives (Dolnicar, Knezevic-Cvelbar and Grün, 2019). Additionally, hotels are increasingly engaging in social sustainability by promoting local culture and sourcing products from local suppliers to support the community (Cozzio et al. 2024). It is evident that hotels' sustainable and green programmes can be regarded as a robust strategy, voluntarily initiated by the management or compelled by legal norms and regulations that oblige firms to implement sustainable activities (Tran, Nguyen and Nguyen, 2025). In both cases, green programmes can be regarded as an opportunity for companies to deepen their relationships with key stakeholders, whilst concomitantly reducing costs for the company itself (Franco, Caroli and Del Chiappa, 2021). However, as Abrate, Pera and Quinton (2020) argued the way consumers evaluate environmental policies has been overlooked. Their study investigated how consumers assess hotels' environmental policies and whether such an evaluation influences their overall satisfaction. Their study employed a unique source of data from a hotel chain's internal platform and analysed 84,470 consumers' reviews. They also addressed the specific review items dedicated to sustainability in popular open online review platforms. There is a lack of understanding whether tourists are willing to skip room cleaning for charity, thus showing prosocial behaviour while on holiday.*

According to social psychologists (e.g. Fiske, 2018), prosocial behaviour is determined by dispositions on the one hand and by situations on the other. According to the former explanation, prosocial behaviour is primarily shaped by upbringing, i.e. the more prosocial elements a parent incorporates into the socialisation process of children, the more likely they are to respond with helpful behaviour in the situation of a person in distress, i.e. to become a prosocial person. According to the other approach, prosocial behaviours are a function of how the individual interprets the situation, as an emergency or not, and of the costs to the helper of intervening in the situation (Bierhoff, 2002). Social psychologists also define prosocial behaviour and its subtypes and manifestations in terms of the underlying motivation of intentionality, which typically differ only in nuances, which is why the literature mostly treats the concept of altruism and prosocial behaviour as synonymous.

Participation in activities that benefit the common good has been demonstrated to engender a sense of moral satisfaction in individuals (Andreoni, 1990). This phenomenon, termed the 'theory of warm glow', posits that people derive intrinsic happiness from contributing to social and environmental causes. In the context of tourism, this theory can be applied to sustainable travel practices, where tourists feel a sense of fulfilment by choosing eco-friendly accommodations or engaging in responsible tourism activities that support local communities and preserve natural

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resources (Li et al. 2023; Taegoo et al. 2025). The warm glow effect has been demonstrated to enhance the experiences of tourists and to foster a positive impact on the destinations they visit (Lv et al. 2024).

Purpose of the paper. *This short paper seeks to contribute to the debate on tourists' sustainable behaviour in accommodation services by drawing on the theory of warm glow and using participatory action research in a four-star hotel in an urban destination. The aim is to explore the sustainable behaviour of tourists in a hotel environment and whether tourists support the charity program of the hotel. Impulsive prosocial behaviours, such as the spontaneous act of giving to individuals or charitable organizations, are here examined. Based on quantitative data collected over 1.5 years on tourists' adherence to the sustainable program, this short paper attempts to answer the following research questions:*

RQ_1: What kind of factors influence tourists' decisions to skip daily room cleaning?

RQ_2: How can the hotel management increase the tourists' warm glow and doing good?

Methodology. *For this study we employed participatory action research methodology. Participatory action research (PAR) in management is a collaborative research methodology that emphasises the active involvement of stakeholders in the research process (Bradbury, 2010). As mentioned before, PAR seeks to address real-world issues by integrating reflection, action and learning among participants. The PAR methodology is predicated on the notion that the world can be understood and improved through its modification. The fundamental principle underpinning this method is the collective and self-reflective inquiry undertaken by researchers and participants, with the objective of enhancing the practices in which they engage and the situations in which they find themselves (Adelman, 1993). The reflective process is inextricably linked to action, influenced by an understanding of history and the local context, and embedded in social relationships. The researcher is not merely an observer, but rather an agent of change involved in the programme planning and monitoring. This method is characterised by its cyclical process of planning, acting/implementing, observing, and reflecting, which allows for continuous feedback and adaptation of strategies. The overarching objective of PAR is to cogenerate actionable knowledge, that is, knowledge that enables organisational actors to implement their intentions. By empowering employees and stakeholders through their involvement in decision-making and problem-solving activities, PAR enhances organisational effectiveness.*

Our participatory action research lasted four years, we started with regular field visits in the hotel and discussed the hotel management aim to launch a green program. Staff members such as the marketing manager, the head of housekeeping, the receptionists and the hotel's general manager were all informed about the research and were interviewed. Data gathering on tourists' behaviour was conducted for 1.5 years and ended in September 2024. Four-star superior, the Continental Hotel is in the Jewish District of Budapest (Hungary), one of the most popular quarters among tourists. The Hungaria Bath opened in 1827. The building, which during the following years also hosted a theatre and a movie hall, was run as a hotel until 1970. It was then abandoned for decades, before being bought and renovated by the Zeina group, reopening in 2010 with 272 rooms. We collected data from more than 64,000 tourists accommodated in the hotel, and our research objective was to explore the different factors that influenced tourists' decisions to skip daily room cleaning. Binary logistic regression was used to analyse the data, considering four factors (management actions, weather, length of stay, demographics) that influence guest compliance with the green program. Our findings provide a novel insight into the key role of committed hotel management in successfully implementing green program.

Results. *To analyse the factors influencing the likelihood of participation in the sustainability program, binary logistic regression was employed. The research, conducted over 1.5 years, identified four main categories of factors through discussions, consultations, and field observations. These categories include management actions, weather conditions, hotel stay characteristics, and demographic variables. The analysis aimed to test the probability of a guest's participation in the program, coded as 0 (No) or 1 (Yes), based on these predictor variables. Binary logistic regression, an advanced form of linear regression for binary outcomes, was utilized for this purpose. The significance of these factors in determining the likelihood of participation in the sustainability program lies in their influence on guests' behaviours and decisions. Effective management strategies can encourage guests to participate by promoting awareness and providing incentives. Clear communication about the program's benefits and the hotel's commitment to sustainability can significantly impact guests' willingness to join. The weather can influence guests' choices and preferences. For instance, during adverse weather conditions, guests might be more inclined to stay indoors and engage with hotel initiatives. In both the management interview and the study by Dolnicar et al (2019), the impact of weather conditions on participation in the sustainability programme was identified as a key factor. The model developed to assess this relationship incorporated the most significant weather variables, namely daily rainfall and maximum temperature, given the anticipated decrease in willingness to engage with the programme.*

The length and nature of a guest's stay can affect their participation. Longer stays provide more opportunities for guests to learn about and engage in the program, while the type of stay (leisure or business) may also play a role in their willingness to participate. Demographic factors such as age and country of origin can shape guests' attitudes towards sustainability and charitable activities. Understanding these variables helps tailor the program to appeal to a broader audience and increase participation rates. The chi-square test result indicates that our model is a significant improvement in fit relative to an intercept-only model, $\chi^2(14) = 1592.109$, $p<.001$. The Hosmer and Lemeshow test (a global fit test) is not statistically significant [$\chi^2(8) = 8.994$, $p=.343$], indicating adequate fit of the model. The results were also commented and discussed both with the hotel manager and the receptionists as part of the participatory action research. In fact, the interview snippets further outline the challenges the sustainability program had to overcome:

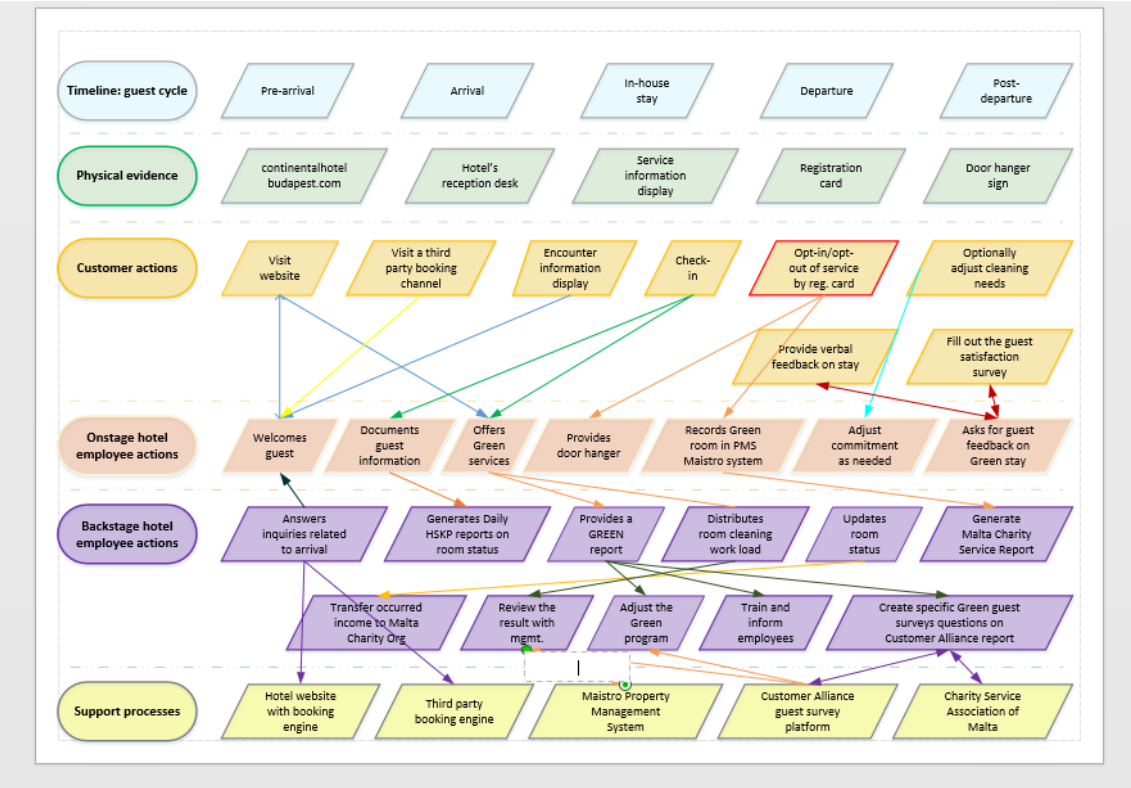
"Our guests who stay with us for a night or two really love being able to enjoy all the hotel has to offer. And of course, those who stay for longer can really relax and explore the city, or just chill in their room. But we do have guests who are in there quite a lot, and they expect their room to be cleaned", (Receptionist_1)

At the programme's initiation, promotional materials are disseminated; however, the reception appears to lack a sense of the programme's significance. This was similar to Peng and Lee's (2019) findings. Instead, receptionist perceived the programme as an additional obligation, and they are not adequately prepared to communicate the programme effectively. After four months, management draws lessons from initial experience to reinvigorate programme, the steps were discussed with the researchers and new interventions were planned following the guidelines of the participatory action research method. As the next quote shows, the hotel was proud of their sustainability program, even if tourists' adherence was not high.

"It's clear that the higher the percentage, the better, but we've only just launched the sustainability program 3 months ago, so it's still in its initial stage. I'm sure we could further develop it, but I think the 2% is a great start", (Interview with the hotel general manager_2023)

Between September and November 2023, the number of participants in the programme dropped dramatically, with a shift in the mix between conferences and corporate events, adherence to the program further decreased. At this point, the decline appeared to be unstoppable, with an indicative drop in the number of participants. In order to identify the pitfalls, we revised the program implementation. During the field research we elaborated a service blueprint to identify and manage the service encounters and to promote the hotel's sustainability program (Figure 1).

Fig. 1: Service blueprint elaborated to identify the pitfalls in implementing the programme



Source: the authors' own elaboration

From January 2024, the researchers in close collaboration with the hotel management, redesigned the sustainability programme and proposed a specific training session for the front desk. For those who were proposing the sustainable programme several benefits and awards were offered. An immediate positive effect was seen as a consequence of such interventions and from the second half of January there was a significant spike in guests' adherence numbers. This result provided evidence of the fruitfulness of the participatory action research method and its cyclical process of planning, acting/implementing, observing, and reflecting, which helped to adapt a different strategy when challenges were identified. At check-in, as shown in Figure 1, guests were offered the opportunity to opt-in or opt-out of the service, and those who opted in were given the registration card and door hanger. The service blueprint revealed that there was no follow up with guests who participated in the hotel's sustainability programme and their 'warm glow' feeling was not kept 'heated' by the hotel staff. As the hotel operations manager recalled in the next quote, the process was not easy.

"In 2024, when we had such a nice increase in guest compliance, it was because we redesigned it. We also did training and you [the researchers] also helped us to improve the communication of the programme. We gave the front desk a script, a script on how to explain the programme to the guests. You helped us a lot with that because you came up with

the idea that we should somehow reward our staff for promoting this initiative. The front desk staff got interested and then it really took off", (Interview with the hotel operation manager_2024)

In the four-star hotel where the study was conducted, it was found that 1.5 kWh of electricity and 100 ml of chemicals are used for each room that is cleaned. It can therefore be concluded that the adoption of this intervention on a wide scale has the potential to contribute substantially to a reduction in the environmental harm caused by tourism. This study demonstrates that an impulsive stimulus aiming to modify tourists' behaviour can be an effective strategy in the process of enhancing the environmental sustainability of hotels. As social psychologists (Bierhoff, 2002; Fiske, 2018) have shown, pro-social behaviour is a function of how an individual interprets a situation, and this is key in tourism and hospitality where tourists have a very short time to decide, for example, whether or not to skip the daily room cleaning. In order to answer the RQ_1, the study showed that the factors that influence tourists' decisions to skip daily room cleaning are diverse and the country of origin, being used to sustainable initiatives in tourism and hospitality and the weather conditions play a significant role.

Overall, skipping daily room cleaning for charity can increase tourists' warm glow feelings. Still, we must acknowledge that guests' adherence to the program stayed limited during the 1.5 years of participatory action research. The service blueprint and the interviews with the hotel management and staff allow us to respond to the RQ_2. The hotel management -if committed to the sustainable programme (and also aims to reduce the costs of housekeeping)- can increase tourists' warm glow by incentivising the members of the staff in promoting the programme. The goals and the achieved results of the sustainability programme should be communicated at the check-out to give feedback to participants and to stimulate their warm glow feeling.

The unique feature of this programme was that guests who participated did not receive any compensation for skipping the room cleaning. The hotel's sustainability programme was kept alive by intensive management intervention, with specific steps introduced at least every three months, otherwise the number of participants would have gradually declined after the first management impulse. A novelty of this research is that the hotel management was in constant discussion with the research team about which elements of the programme could be changed to make it more effective.

Research limitations. *In this research, the destination type was not a consideration. The participatory action research was conducted in an urban destination; therefore, the results cannot be generalised. In comparison to other destination types (natural sites, rural areas), urban destinations and four-star hotels present a less vulnerable environment. Consequently, tourists may be less sensitive to environmental concerns than others who have selected a different destination type and accommodation service. Therefore, future research should consider environmental awareness and other accommodation types in a rural or mountain tourism destinations and whether 'warm glow' can be induced in a different way to stimulate tourists to behave more pro-environmentally.*

Managerial implications. *The action research findings provide useful and concrete steps for hotel management and other tourism service providers to implement and manage a green program that is capable of stimulating tourists to behave in a more sustainable way in the long term. As part of our action research, we have formulated several specific managerial implications that can be leveraged by hotel hotels and accommodation services in urban settings. In our case, it appears that the sustainability programme is not adequately communicated within the hotel's channels. It is neither mentioned in the mission statement nor made visible on the website. This oversight necessitates a concerted effort from management to maintain the program's functionality, especially during periods when momentum may wane. Guests have a limited time to decide whether to participate in the programme. As hotels and innovative tourism service providers continue to establish voluntary green programs, our findings can be used in any situation where the management goals are honourable but face different barriers that need to be overcome. In the contemporary context, where hotels utilise digital platforms to communicate their environmental commitment through the adoption of sustainability programmes and to provide guests with the opportunity to access pertinent information to reduce their carbon footprint, it is imperative to utilise these digital platforms to showcase success and achievements in this domain.*

Originality of the paper. *This short paper contributes to the debate on tourists' sustainable behaviour in accommodation services by drawing on 'warm glow' and the use of PAR. Hotel guests were invited to join a sustainability program by opting out of daily room cleaning, with the hotel contributing €1 per room per night to a charitable organization. According to the economics literature, the act of giving is often seen as selfish and impurely altruistic. The concept of 'warm glow,' as proposed by Andreoni (1990), refers to the enjoyable sensation experienced when performing a good deed. Data of more than 64.000 guests collected for 1.5 years evidenced the factors that impact tourists' decision making in hotels. The participatory action research helped to create actionable knowledge and bridged the gap between theory and practice.*

Key words: *four-star hotel, sustainable behaviour, participatory action research, warm glow theory, sustainability program, binary logistic regression*

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A-RIES: un modello adattivo per la rigenerazione del patrimonio

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Abstract

La gestione del patrimonio culturale richiede un approccio integrato che concili tutela, valorizzazione e sostenibilità economica. Il presente studio propone il modello A-RIES (Adaptive Regeneration Index for Effective Strategies) come framework innovativo per la rigenerazione del patrimonio culturale, superando le rigidità dei modelli tradizionali attraverso un sistema adattivo e data-driven (McAfee et al., 2012, Provost, F. et al., 2013, Witten et al., 2016). L'integrazione di metodi multicriteriali, quali Analytic Hierarchy Process (AHP) e Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), consente di ottimizzare i processi decisionali, riducendo la soggettività nelle scelte strategiche. A-RIES si distingue per la capacità di adattarsi a contesti normativi ed economici eterogenei, promuovendo una governance partecipativa che coinvolge attivamente stakeholder pubblici e privati. Il modello incorpora inoltre principi di economia circolare, favorendo il riuso adattivo del patrimonio edilizio e l'adozione di strategie finanziarie sostenibili. L'analisi empirica condotta sul caso studio dello Scugnizzo Liberato dimostra l'efficacia di A-RIES nel migliorare la sostenibilità e la resilienza dei progetti di rigenerazione culturale. Tuttavia, il framework presenta alcune limitazioni, tra cui la necessità di una validazione su scala più ampia e il rischio di soggettività nell'assegnazione dei pesi decisionali. L'integrazione di strumenti di machine learning e l'adozione di tecniche di valutazione più avanzate potrebbero rafforzare la robustezza del modello, ampliandone l'applicabilità a diversi contesti territoriali. I risultati dello studio offrono un contributo significativo alla letteratura sulla gestione del patrimonio culturale, proponendo un modello scalabile e replicabile che coniuga innovazione gestionale, sostenibilità e valorizzazione sociale.

Framing of the research. *La gestione del patrimonio culturale si configura come un processo complesso e multidimensionale, che deve conciliare la tutela dei beni con la loro valorizzazione e sostenibilità economica. In questo contesto, la rigenerazione urbana rappresenta uno strumento essenziale per ridare vita a spazi dismessi e beni culturali inutilizzati, promuovendo modelli di governance integrata e strategie di sviluppo sostenibile. La crescente attenzione verso il riuso adattivo del patrimonio culturale testimonia un cambio di paradigma nella gestione di questi beni, orientato non solo alla conservazione, ma anche alla creazione di valore economico e sociale (Kulshrestha & Srivastava, 2025, Milella F., 2024, Fusco Girard et al., 2021).*

Tuttavia, i modelli di gestione attualmente in uso presentano significativi limiti e criticità. L'approccio prevalentemente burocratico e gerarchico adottato dalle istituzioni pubbliche ostacola l'implementazione di strategie dinamiche e flessibili (Daniel et al.,2024). La rigidità normativa, la lentezza dei processi decisionali e la frammentazione delle competenze tra diversi livelli di governo spesso ritardano l'attuazione di interventi di rigenerazione, limitandone l'efficacia. A ciò si aggiunge una cronica carenza di risorse finanziarie, che rende difficile la manutenzione ordinaria e straordinaria dei beni culturali, favorendo il loro degrado progressivo (Wang & Fouseki, 2025). L'assenza di un coordinamento centralizzato tra enti pubblici e la mancata armonizzazione delle normative a livello locale, nazionale ed europeo aggravano ulteriormente le difficoltà operative, riducendo l'efficienza delle politiche di gestione.

Un ulteriore problema è rappresentato dalla scarsa integrazione tra settore pubblico e privato. Sebbene strumenti come il Partenariato Pubblico-Privato (PPP) e il Partenariato Speciale Pubblico-Privato (PSPP) abbiano dimostrato un potenziale significativo (Moliterni, 2019; Smith, 2020), la loro applicazione è spesso ostacolata da normative inadeguate e da una diffusa mancanza di competenze gestionali specifiche (Baarveld et al., 2018, Boniotti, C., 2019, Boniotti C., 2023, Bosco et al., 2023, Rossitti et al., 2021). Inoltre, il coinvolgimento della società civile rimane limitato, con una partecipazione spesso simbolica piuttosto che realmente influente nei processi decisionali (Guediri & Bouchemal, 2024, Baarvel et al. 2018, Boniotti C., 2019, Bosco et al.,2023, Cerreta et al., 2020, Doroz-Turek M., 2019, Kountouri et al., 2018, Oppio et al., 2017, Rosetti et al., 2022, Rosetti et al., 2022).). Questo fenomeno è particolarmente evidente nelle aree periferiche e nei piccoli centri urbani, dove le comunità locali potrebbero svolgere un ruolo cruciale nella valorizzazione del patrimonio, ma vengono escluse dai processi decisionali per mancanza di strumenti e risorse

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adeguati (Council of Europe, 2005, Oppio et al., 2017 Kountouri et al., 2018, Cerreta et al., 2020, De Gregorio et al. 2020, Doroz-Turek, M. 2019, Fava, F., 2021, Gravagnuolo et al., 2021, Pickerill, T., 2021, Imperiale, F. 2022, Rosetti et al. 2022).

Dal punto di vista operativo, le strategie di gestione attuali raramente adottano strumenti innovativi di analisi e monitoraggio. L'assenza di un sistema strutturato di valutazione degli impatti economici, sociali e ambientali porta a decisioni inefficaci e scarsamente sostenibili nel lungo periodo. L'uso limitato di tecnologie digitali e big data nella pianificazione e nel controllo delle strategie di valorizzazione (McAfee et al., 2012, Witten et al., 2016) costituisce un'ulteriore debolezza del sistema. Le metodologie di valutazione attualmente impiegate si basano su parametri tradizionali, spesso inadeguati per catturare la complessità delle dinamiche di rigenerazione urbana e di gestione del patrimonio culturale (Salerno, E., 2020, Bottero et al., 2019, Cucco et al., 2023, Dabbene et al., 2022, Della Spina et al., 2021 e 2023, Guccio et al. 2017, Nocca et al., 2022, Oppio et al., 2017, Torrieri et al., 2019). La mancanza di una standardizzazione nelle metriche di impatto impedisce inoltre un confronto efficace tra diversi progetti, limitando la possibilità di replicare le best practices su scala nazionale e internazionale (Kriswandwitanaya & Nurussobah, 2024).

Un altro aspetto critico è la difficoltà di accesso ai finanziamenti (Baarveld et al., 2018, Boniotti, C., 2019, Boniotti C., 2023, Bosco et al., 2023, Rossitti et al., 2021). Le politiche di finanziamento per la conservazione e la valorizzazione del patrimonio sono spesso frammentarie e legate a bandi pubblici che non garantiscono continuità nel tempo (Jawabreh et al., 2024). La dipendenza da fondi pubblici limita la capacità di pianificazione a lungo termine, mentre l'assenza di incentivi strutturali per gli investitori privati riduce l'attrattività di progetti di rigenerazione urbana. Inoltre, i modelli di business attuali non sempre riescono a garantire un equilibrio tra sostenibilità economica e tutela del patrimonio, con il rischio di subordinare gli obiettivi culturali a logiche di mero profitto (Stamatoudi & Roussos, 2024).

La ricerca si inserisce in questo dibattito contribuendo alla letteratura sulla gestione del patrimonio culturale e della rigenerazione urbana, proponendo un modello replicabile in diversi contesti territoriali e scalabile in funzione delle specifiche esigenze locali. La ricerca intende fornire evidenze empiriche sull'efficacia di un approccio basato sull'analisi multicriterio per supportare le decisioni strategiche, con l'obiettivo di migliorare la sostenibilità e l'efficienza dei progetti di rigenerazione urbana.

Purpose of the paper. *Il presente studio intende dimostrare come il Framework A-RIES possa costituire una soluzione innovativa alle criticità che caratterizzano i modelli tradizionali di gestione del patrimonio culturale. L'analisi si sviluppa a partire dalla constatazione che le strategie attualmente adottate risultano spesso inefficaci nell'affrontare la complessità dei processi di valorizzazione e rigenerazione urbana dei beni culturali (Wei et al., 2025). Tali inefficienze derivano principalmente da vincoli normativi stringenti, da processi decisionali frammentati, da una governance poco strutturata e da un accesso limitato alle risorse finanziarie. A-RIES si propone dunque come un modello adattivo, in grado di rispondere a queste criticità attraverso un approccio basato sull'analisi multicriterio e sulla gestione flessibile delle risorse (Park & Kang, 2025).*

La struttura del framework si fonda sull'integrazione di tre livelli di determinanti che influenzano le decisioni strategiche: quelle stabili, relative agli aspetti normativi e finanziari; quelle dinamiche, che comprendono le evoluzioni delle politiche pubbliche e le trasformazioni del contesto economico; e quelle funzionali, che includono strumenti operativi e indicatori di performance (Guediri & Bouchemal, 2024). L'interazione tra questi elementi consente di sviluppare strategie di intervento capaci di adattarsi ai contesti territoriali di riferimento, superando la rigidità dei modelli gestionali tradizionali. La possibilità di calibrare le strategie in funzione delle esigenze locali rappresenta un elemento distintivo di A-RIES, che si configura come un sistema di gestione orientato alla sostenibilità e alla valorizzazione equilibrata del patrimonio culturale (Chakraborty & Ji, 2024).

Un aspetto centrale del framework riguarda l'adozione di strumenti di valutazione ex-ante ed ex-post, che permettono di verificare l'efficacia degli interventi nel tempo e di adattare le strategie gestionali sulla base delle nuove esigenze emergenti. Questo meccanismo di monitoraggio continuo consente di superare la frammentarietà delle attuali metodologie di pianificazione, spesso caratterizzate da approcci rigidi e scarsamente adattivi. La capacità di individuare in maniera tempestiva le eventuali criticità e di correggere le strategie in corso d'opera rappresenta un fattore chiave per garantire una gestione più efficiente e sostenibile dei beni culturali (Ruban L., 2024).

Oltre all'aspetto tecnico-operativo, A-RIES introduce un modello di governance che favorisce il coinvolgimento attivo di una pluralità di attori, tra cui istituzioni pubbliche, investitori privati e società civile. L'integrazione di strumenti di co-progettazione consente di superare le barriere che spesso limitano la collaborazione tra i diversi stakeholder, promuovendo una visione condivisa della rigenerazione urbana e della gestione del patrimonio culturale (Imnadze & Vardosanidze, 2024). La partecipazione della comunità locale nei processi decisionali risulta particolarmente rilevante in quanto contribuisce a garantire una maggiore accettabilità sociale degli interventi e a rafforzare il senso di appartenenza al patrimonio culturale.

L'obiettivo principale dello studio è quello di valutare l'efficacia di A-RIES rispetto ai modelli tradizionali attraverso un'analisi teorica e un caso studio applicato. L'indagine si concentra sull'identificazione delle inefficienze gestionali attualmente riscontrabili nel settore della rigenerazione urbana e sulla capacità del framework di risolvere tali problematiche mediante un approccio più integrato e adattivo. L'analisi empirica permette di misurare i benefici derivanti dall'adozione di A-RIES in termini di sostenibilità economica e sociale, efficienza gestionale e maggiore coinvolgimento degli stakeholder.

Attraverso questa prospettiva, lo studio intende offrire un contributo significativo alla letteratura accademica sulla gestione del patrimonio culturale, evidenziando il potenziale di un modello replicabile e scalabile che possa essere

applicato in contesti territoriali diversi. L'adozione del framework non solo garantisce un miglioramento nella pianificazione degli interventi di rigenerazione urbana, ma promuove anche una gestione più consapevole e sostenibile delle risorse, contribuendo alla creazione di ecosistemi urbani più resilienti e inclusivi.

Methodology. *L'approccio metodologico adottato nello studio si basa sull'analisi della struttura del Framework A-RIES, che rappresenta un sistema decisionale avanzato per la gestione del patrimonio culturale. Il modello combina metodologie di ottimizzazione con tecniche di analisi multicriterio al fine di selezionare strategie di rigenerazione urbana e valorizzazione del patrimonio che siano efficienti e sostenibili. La struttura metodologica del framework si articola in quattro fasi principali, ognuna delle quali consente di migliorare la capacità di analisi e di adattamento alle variabili contestuali.*

La prima fase consiste nella definizione e nella raccolta dei parametri fondamentali per la valutazione delle strategie gestionali. In questa fase, vengono classificati i principali fattori che influenzano il processo decisionale, suddivisi in determinanti stabili, dinamiche e funzionali. Vengono inoltre identificati gli indicatori chiave di performance (KPI) e raccolti dati quantitativi e qualitativi provenienti dal contesto di riferimento. Questo passaggio è essenziale per garantire una base di analisi coerente e per strutturare il modello in modo che possa adattarsi alle specificità territoriali e normative. L'affidabilità dei dati raccolti è un aspetto cruciale in questa fase, in quanto le decisioni strategiche devono essere supportate da informazioni aggiornate e rappresentative della realtà operativa.

Successivamente, la metodologia prevede un processo di normalizzazione e ponderazione delle variabili raccolte. Attraverso tecniche matematiche avanzate, viene garantita la comparabilità dei dati, riducendo le distorsioni legate a differenti unità di misura e scale di valutazione. Per attribuire un peso relativo a ciascun fattore, il framework utilizza il metodo Analytic Hierarchy Process (AHP) (Darko et al., 2019), che permette di determinare l'importanza di ciascuna variabile in relazione agli obiettivi strategici della gestione del patrimonio. Questo passaggio consente di strutturare le informazioni in maniera gerarchica, facilitando la successiva fase di valutazione. La metodologia AHP si basa sulla decomposizione del problema decisionale in una struttura gerarchica e sull'assegnazione di pesi ai diversi criteri attraverso un processo di comparazione a coppie, che garantisce una maggiore obiettività nelle scelte strategiche.

Il terzo livello metodologico si concentra sull'analisi multicriterio e sulla selezione delle strategie ottimali. In questa fase, il framework adotta l'Indice di Efficacia Strategica (IES), un parametro che misura la capacità di una strategia di avvicinarsi alla soluzione ideale, calcolato come segue:

$$IES_i \; \frac{d_i^+ - d_i^-}{d_i^+ + d_i^-}$$

Dove d_i^+ rappresenta la distanza della strategia i dalla soluzione ideale positiva e d_i^- indica la distanza dalla soluzione ideale negativa. Il metodo TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) viene utilizzato per ordinare le alternative disponibili in funzione della loro vicinanza alla soluzione ottimale teorica. Questo approccio permette di individuare la strategia più efficace rispetto agli obiettivi prefissati, garantendo al tempo stesso una valutazione comparativa delle diverse opzioni disponibili. L'adozione del metodo TOPSIS si rivela particolarmente efficace nel contesto della gestione del patrimonio culturale, poiché consente di considerare simultaneamente una molteplicità di fattori decisionali e di ottenere un ranking delle alternative basato su un criterio di ottimizzazione globale.

L'IES assume valori compresi tra 0 e 1, dove, un valore vicino a 1 indica una strategia altamente efficace, ovvero una gestione che si avvicina alla soluzione ideale. In questo caso, il modello di gestione del patrimonio culturale risulta ben strutturato, con elevata stabilità normativa, capacità di adattamento alle variabili economiche e strumenti operativi efficienti. Invece, un valore vicino a 0 indica una strategia poco efficace, ovvero una gestione che si avvicina alla soluzione peggiore. In questo caso, il sistema presenta gravi criticità, come instabilità normativa, scarsa sostenibilità finanziaria, bassa capacità di adattamento e mancanza di strumenti di monitoraggio. Pertanto, un valore moderato (tra 0.5 e 0.7) suggerisce che la gestione presenta elementi positivi ma anche criticità da migliorare.

L'ultima fase del modello riguarda la simulazione e l'adattamento delle strategie nel tempo. Il framework prevede un monitoraggio costante delle determinanti dinamiche, come l'evoluzione delle politiche pubbliche, le variazioni normative e le fluttuazioni economiche. L'algoritmo di A-RIES include una funzione di adattamento dinamico che aggiorna i parametri del modello in base ai mutamenti del contesto. Inoltre, viene considerata una funzione specifica di gestione del rischio e delle risorse economiche, formalizzata nella seguente equazione:

$$A - RIES = arg\ arg\ (IES_i * W_a + A(D_t) + F(R))$$

Dove Wa rappresenta il peso delle determinanti stabili, $A(D_t)$ è la funzione di adattamento che tiene conto delle variabili dinamiche e F(R) è la funzione di gestione del rischio e delle risorse economiche.

Questo approccio consente di calibrare le strategie in funzione della disponibilità finanziaria e delle condizioni di mercato, rendendo il modello flessibile e reattivo ai cambiamenti del contesto. L'adattabilità di A-RIES permette di ridurre l'incertezza associata agli investimenti nel settore del patrimonio culturale, garantendo una maggiore efficienza nell'allocazione delle risorse disponibili.

L'interpretazione dei risultati della formula A-RIES assume valori positivi, dove valori elevanti indicano uno scenario ottimale, valutando il modello di gestione del patrimonio culturale come sostenibile e replicabile. Viceversa, se il valore

è prossimo allo zero, il modello indica uno scenario critico, valutando il modello di gestione del patrimonio culturale come fragile, inefficacie e difficilmente replicabile.

Results. *Il caso studio dello Scugnizzo Liberato a Napoli rappresenta un esempio emblematico di riuso adattivo del patrimonio culturale, caratterizzato da un forte coinvolgimento della comunità locale e da un modello di governance innovativo. Situato all'interno di un ex complesso ecclesiastico, il progetto si fonda sulla logica del "commoning" e sul riconoscimento del bene come "bene comune urbano d'uso civico" da parte del Comune di Napoli. Questa configurazione giuridica ha permesso alla comunità locale di assumere un ruolo attivo nella gestione e nella valorizzazione dello spazio, favorendo la sperimentazione di modelli di economia alternativa, la produzione culturale indipendente e forme di mutualismo sociale (Fava F., 2021).*

L'analisi del caso studio è stata condotta attraverso l'applicazione del Framework A-RIES, con l'obiettivo di valutare l'efficacia della strategia adottata in termini di sostenibilità economica, governance partecipativa e capacità di adattamento nel tempo. Il modello ha considerato tre macro-categorie di determinanti: stabili, dinamiche e funzionali. Le determinanti stabili, tra cui il riconoscimento giuridico come bene comune e la governance basata sul Partenariato Pubblico-Privato-Persone (P4), hanno fornito un quadro strutturale solido per la gestione dell'iniziativa. Le determinanti dinamiche, come l'evoluzione normativa e le fluttuazioni economiche, hanno evidenziato la capacità del modello di rispondere ai mutamenti del contesto attraverso strategie di auto-sostenibilità e adattamento delle pratiche gestionali. Le determinanti funzionali, tra cui gli strumenti di monitoraggio e le strategie di pianificazione, hanno consentito di misurare e ottimizzare l'impatto delle attività svolte, migliorando la resilienza complessiva dell'iniziativa.

L'assegnazione dei pesi alle diverse categorie di determinanti è avvenuta attraverso il metodo Analytic Hierarchy Process (AHP), che ha permesso di quantificare l'importanza relativa di ciascun elemento rispetto agli obiettivi generali di sostenibilità e rigenerazione del patrimonio culturale. Il peso attribuito alle determinanti stabili è stato pari a 0.72, sottolineando il ruolo cruciale della governance e della solidità istituzionale nella gestione del bene. Il valore delle determinanti dinamiche è stato fissato a 0.45, riflettendo le difficoltà legate alla capacità del modello di rispondere ai mutamenti normativi ed economici. Infine, il peso delle determinanti funzionali è risultato essere di 0.38, evidenziando la necessità di strumenti più strutturati per la pianificazione e il monitoraggio delle performance gestionali ed economiche.

L'applicazione del Framework A-RIES al caso dello Scugnizzo Liberato ha fornito un valore complessivo dell'A-RIES Unico pari a 1.634[5]. Per assicurare confrontabilità tra casi, il valore dell'ARIES Unico, deve essere espresso su scala normalizzata o mediante un modello aggregato coerente. La formula prevista per l'ARIES Unico combina l'ARIES Totale (efficacia strategica cumulativa), l'IES media (TOPSIS) (efficacia strategica relativa) e le Interazioni dinamiche (adattabilità strategica). Questo risultato indica una performance moderata (secondo il range 0-1 basso, 1-2 moderato, 2-3 alto) con aspetti positivi legati alla governance e al riconoscimento giuridico del bene, ma anche con limiti strutturali relativi alla gestione finanziaria e alla capacità di adattamento dinamico. Le determinanti stabili hanno ottenuto un punteggio di 0.823, confermando la solidità istituzionale del modello e l'importanza della governance partecipativa. Le determinanti dinamiche hanno riportato un valore di 0.591, evidenziando difficoltà nella risposta ai cambiamenti normativi ed economici. Le determinanti funzionali hanno ottenuto il punteggio più basso, pari a 0.523, riflettendo la carenza di strumenti avanzati di gestione e monitoraggio finanziario.

L'analisi della funzione di ottimizzazione A-RIES ha permesso di individuare ulteriori criticità e punti di forza del modello gestionale. La governance si conferma come l'elemento più solido del progetto, con un peso di 0.72. Tuttavia, la capacità di adattamento ai cambiamenti normativi ed economici, rappresentata dal valore della funzione di adattamento dinamico A(Dt), è risultata pari a 0.45, indicando una limitata reattività del modello. Inoltre, il valore della funzione di gestione del rischio e delle risorse economiche F(R) è stato di 0.38, evidenziando la mancanza di una strategia finanziaria strutturata, elemento che potrebbe compromettere la sostenibilità a lungo termine dell'iniziativa.

Un'analisi più approfondita dei dati raccolti ha evidenziato che, sebbene la governance partecipativa costituisca una risorsa fondamentale per la stabilità del modello, la mancanza di un piano economico a lungo termine limita la capacità del progetto di consolidarsi. La dipendenza da risorse volontarie e da meccanismi di autofinanziamento si traduce in un'incertezza operativa che impedisce di sviluppare strategie di investimento e di espansione più strutturate. L'assenza di un sistema di monitoraggio finanziario continuo rende inoltre difficile valutare l'impatto economico delle attività realizzate e individuare soluzioni per ottimizzare la gestione delle risorse disponibili.

Il confronto con modelli di gestione di patrimoni culturali simili ha evidenziato che i progetti di rigenerazione urbana di maggior successo si basano su una diversificazione delle fonti di finanziamento, includendo contributi pubblici, fondi europei e partnership con il settore privato. Lo Scugnizzo Liberato, invece, si affida principalmente a un modello di autogestione con finanziamenti limitati, il che costituisce un rischio significativo per la sostenibilità dell'iniziativa nel lungo periodo.

L'analisi ha inoltre rivelato che la partecipazione attiva della comunità locale ha rappresentato un elemento chiave nella gestione del bene, contribuendo a creare un forte senso di appartenenza e a garantire la continuità delle attività. Tuttavia, la gestione informale delle risorse finanziarie e la mancanza di strumenti di pianificazione avanzati limitano la possibilità di scalabilità del progetto. In questo contesto, l'introduzione di strumenti di gestione più strutturati potrebbe rafforzare la capacità del modello di rispondere in modo più efficace alle sfide economiche e normative future.

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[5] Il valore dell'ARIES Unico è calcolato come combinazione delle tre componenti del modello: ARIES Totale, IES media (normalizzata tramite TOPSIS) e Interazioni dinamiche.

L'interpretazione di questi risultati conferma che il modello gestionale dello Scugnizzo Liberato presenta punti di forza significativi in termini di governance e stabilità istituzionale, ma al tempo stesso mette in luce carenze nel sistema di gestione economica e nella capacità di adattamento strategico. Sebbene la governance partecipativa abbia garantito la continuità del progetto, la dipendenza da finanziamenti non strutturati e da contributi volontari rappresenta un fattore di vulnerabilità. La sostenibilità nel lungo periodo potrebbe essere compromessa dall'assenza di un modello finanziario strutturato e dalla mancanza di strumenti di monitoraggio avanzati.

Nel complesso, i risultati ottenuti suggeriscono che il caso dello Scugnizzo Liberato rappresenta un esempio virtuoso di rigenerazione urbana e valorizzazione del patrimonio culturale attraverso un approccio basato sulla partecipazione e sull'innovazione sociale. Tuttavia, affinché il modello possa essere replicato con successo in altri contesti, è necessario rafforzare le componenti finanziarie e istituzionali, garantendo maggiore stabilità alle strategie di gestione e aumentando le capacità di adattamento alle sfide future. L'applicazione del Framework A-RIES ha consentito di individuare punti di forza e criticità del modello, offrendo spunti per il miglioramento delle pratiche di governance e per la definizione di strategie più efficaci di valorizzazione del patrimonio culturale.

Research limitations. *Nonostante i risultati positivi, il modello A-RIES presenta alcune limitazioni che ne condizionano l'applicabilità e la robustezza. La validazione su scala più ampia rimane una sfida, poiché il modello è stato testato su un singolo caso studio, rendendo necessaria un'estensione a contesti geografici e normativi differenti per verificarne la replicabilità e l'adattabilità (European Commission, 2019; UNESCO, 2020). Un altro limite riguarda l'analisi predittiva, che potrebbe essere migliorata mediante l'integrazione di strumenti di machine learning, ottimizzando la valutazione strategica e adattando dinamicamente il modello ai cambiamenti di contesto (Liu et al., 2023; Paiola, 2018). Inoltre, l'applicazione di A-RIES in territori con governance meno strutturata potrebbe incontrare ostacoli legati alla carenza di dati affidabili, alla limitata capacità amministrativa e alla difficoltà di coinvolgimento degli stakeholder privati, richiedendo un adattamento del framework a sistemi decisionali semplificati (Smith, 2020). Infine, un aspetto critico riguarda la soggettività nella definizione dei pesi e delle ponderazioni nei metodi multicriteriali AHP e TOPSIS, che potrebbe introdurre bias nelle decisioni. Per mitigare questo problema, si suggerisce l'impiego di tecniche come l'Entropy Weighting Method, la fuzzy logic e l'analisi di sensitività, al fine di migliorare l'oggettività e l'affidabilità del modello (Saaty, 2008; Shannon, 1948; Saltelli et al., 2008). Questi sviluppi potrebbero rafforzare la capacità del modello di supportare decisioni più robuste e adattabili a contesti complessi.*

Managerial implications. *L'implementazione del modello A-RIES introduce un approccio gestionale innovativo per la rigenerazione del patrimonio culturale, superando le rigidità dei modelli tradizionali grazie a un framework adattivo e basato su dati. Questo sistema consente di ottimizzare l'allocazione delle risorse pubbliche, migliorare la trasparenza decisionale e facilitare l'accesso ai finanziamenti europei, favorendo una governance più efficace e partecipativa (Girard, 2020; Fusco Girard, 2021). Per il settore privato, A-RIES riduce l'incertezza sugli investimenti attraverso modelli predittivi, identificando opportunità di business e incentivando partenariati pubblico-privati, con ricadute positive in termini di corporate social responsibility e valorizzazione economica dei progetti di rigenerazione (Paiola, 2018; Moliterni, 2019). Le comunità locali traggono vantaggio dall'integrazione di processi di co-design e co-gestione, favorendo l'inclusione sociale e la sostenibilità economica degli interventi, mentre l'adozione di metriche per il capitale sociale consente di valutare gli impatti sul benessere collettivo (Ostrom, 1990; UNESCO, 2020). Inoltre, il modello incorpora strategie di economia circolare (Gianfrate et al., 2020, Fusco Girard, L., 2021), riducendo l'impronta ecologica dei progetti e promuovendo il riuso adattivo del patrimonio esistente, con effetti positivi sia dal punto di vista ambientale che economico (Fusco Girard, 2021). A-RIES rappresenta dunque un sistema integrato per la gestione del patrimonio culturale, in grado di coniugare efficienza operativa, sostenibilità finanziaria e ambientale, innovazione gestionale e valorizzazione sociale.*

Originality of the paper. *Il modello A-RIES (Adaptive Regeneration Index for Effective Strategies) introduce un framework decisionale dinamico, adattivo e multidimensionale per la rigenerazione del patrimonio culturale, superando le rigidità dei modelli tradizionali. La sua innovazione risiede nell'integrazione di un approccio multicriteriale quantitativo (AHP-TOPSIS) con una governance adattiva, consentendo l'aggiornamento continuo delle strategie sulla base di dati dinamici e scenari previsionali (Saaty, 2008; Fusco Girard, 2021; Liu et al., 2023). L'applicazione combinata di AHP per la ponderazione dei criteri e di TOPSIS per l'ottimizzazione delle strategie riduce la soggettività decisionale, offrendo un supporto strutturato ai processi di rigenerazione (Hwang & Yoon, 1981; Ostrom, 1990).Elemento distintivo del modello è il coinvolgimento attivo degli stakeholder attraverso un paradigma di governance partecipativa, che integra comunità locali, enti pubblici e investitori privati nel processo decisionale. L'adozione di piattaforme di open governance, meccanismi di co-progettazione e strumenti di monitoraggio degli impatti sociali migliora l'accettabilità e la sostenibilità delle strategie di rigenerazione (Kohtamäki et al., 2019; Imperiale, 2022).A-RIES innova inoltre la gestione del patrimonio culturale applicando i principi dell'economia circolare, promuovendo il riuso adattivo degli edifici storici, modelli di finanziamento sostenibili basati su partenariati pubblico-privati e l'integrazione di materiali eco-compatibili nella progettazione (Girard, 2020; Moliterni, 2019; European Commission, 2019). Questa prospettiva supera la dicotomia tra conservazione e valorizzazione, delineando un approccio resiliente e sostenibile alla rigenerazione del patrimonio.*

Key words: *Rigenerazione urbana, patrimonio culturale, AHP-TOPSIS, governance partecipativa, economia circolare, sostenibilità.*

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Track 15
Tertiarization & Sustainability. New challenges for management in the Digital Era

Can digitalization foster Social Inclusion? Evidences from Italy and Switzerland

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Abstract

The study examines the impact of digitalization on social inclusion, focusing on Italy's significant investment in digital transformation under the Next Generation EU program. Using a Difference-in-Differences approach with treatment intensity, we compare Italian regions with high digital investments to Swiss regions that have not implemented similar policies. The results show that digitalization reduces the rate of people "At Risk of Poverty or Social Exclusion", "People in Households with Very Low Labor Market Participation", and "Unemployment". Adopting Amartya Sen's Capability Approach, this paper analyzes the conditions necessary to maximize the effectiveness of these investments in promoting social inclusion.

Framing of the research. *In recent years, governments and international organizations have increasingly embraced digital transformation, integrating digital technologies into public administration to enhance efficiency, accessibility, and citizen engagement (Mora et al., 2021; Padeiro et al., 2021; Stolterman & Fors, 2004). This shift aims not only to modernize public services by making them more transparent and user-centric but also to streamline administrative procedures and optimize resource management (Adjei-Bamfo et al., 2019; De Boer, 2021; Faulkner et al., 2019; Ramaprasad et al., 2017).*

Recognizing the strategic importance of digitalization, the European Union has placed it at the core of its Next Generation EU program, a 750 billion euro recovery plan designed to support economic and social resilience. As part of this initiative, each member state was required to allocate at least 20% of its national recovery and resilience plan (NRRP) to digital transformation (European Commission, 2021). Italy has played a leading role in this effort, committing over 48 billion euros, the highest investment among EU countries, to modernizing its digital infrastructure and public services. While these investments are expected to improve governance and economic performance, their ability to reduce social exclusion remains a critical and underexplored issue.

Social exclusion, broadly defined as the condition in which individuals or groups face barriers that limit their full participation in economic, social, and civic life (Rawal, 2008), is a persistent challenge that digitalization is often seen as a tool to address. However, simply introducing digital tools does not automatically foster inclusion, what matters is whether individuals can effectively use them to enhance their lives. To understand this dynamic, this study adopts Amartya Sen's Capability Approach (1999), which shifts the focus from the mere availability of resources to an individual's ability to transform them into meaningful opportunities. From this perspective, digitalization is not just about expanding technological access; rather, it is a means to empower individuals by removing structural barriers and enabling them to participate more fully in society (Hildebrand et al., 2019; Sen, 1999).

Through this lens, digitalization can promote social inclusion in multiple ways. First, it improves access to essential services, particularly for marginalized communities. E-government platforms simplify bureaucratic procedures, ensuring that citizens, especially those in remote areas or with mobility limitations, can interact with public institutions more efficiently and access critical services such as tax administration, social benefits, and legal documentation without facing physical or bureaucratic obstacles (Houwen, 2011; Jacobson, 2016; Toboso, 2011). Similarly, telemedicine and digital healthcare solutions help bridge health disparities by offering remote medical consultations, making healthcare more accessible for those who might otherwise be excluded due to distance or economic constraints (Nikou et al., 2020).

Beyond improving service access, digitalization also fosters economic inclusion by enabling participation in the labor market. The rise of remote work, digital job platforms, and online training programs reduces dependency on physical proximity to employment opportunities, allowing individuals in disadvantaged areas or with mobility constraints to integrate into the workforce more effectively (Andersson et al., 2022; Morte-Nadal & Esteban-Navarro, 2022). Additionally, digital platforms facilitate lifelong learning and upskilling, helping individuals enhance their employability and adapt to an evolving labor market (Toboso, 2011).

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At the societal level, digital tools enhance civic engagement and institutional trust by increasing transparency and participatory governance. Open government initiatives and online engagement platforms provide citizens with greater access to information and decision-making processes, strengthening democratic participation, particularly among marginalized groups (Marsman, 2022; Gandini & Gandini, 2016). The availability of digital tools such as Voting Advice Applications (VAA) and participatory budgeting platforms fosters a sense of political inclusion, ensuring that diverse voices are heard in public discourse (Dobija et al., 2023; Fleischer & Carstens, 2022).

However, while digitalization has the potential to promote inclusion, its effects are not universally positive. Several studies highlight that it can, in some cases, exacerbate existing inequalities if certain groups, such as low-income individuals, the elderly, or those with limited digital literacy, lack the necessary skills or resources to navigate digital platforms (Adamczyk & Betlej, 2021; Buchert et al., 2023; Schou & Pors, 2018). Furthermore, the increasing reliance on algorithmic decision-making raises concerns about involuntary discrimination, as biases in automated systems may disproportionately disadvantage individuals from lower socio-economic backgrounds (Kwiliński et al., 2020; Ranchordás, 2022). These contrasting perspectives suggest that while digitalization holds promise as an inclusion-enhancing tool, its effectiveness depends on how it is implemented and whether complementary policies address existing digital divides.

This study seeks to clarify this debate by providing empirical evidence on the relationship between digitalization and social inclusion. By comparing Italian regions that have significantly invested in digitalization with Swiss regions that have not implemented similar policies, this research applies a Difference-in-Differences (DiD) approach with treatment intensity to assess how digital investments impact key exclusion indicators. By integrating the Capability Approach into this framework, this study also aims to provide a conceptual contribution by identifying the conditions needed to maximize the impact of digital investments in reducing social exclusion.

Purpose of the paper. *This study aims to assess whether and to what extent digitalization can reduce social exclusion by expanding individuals' capabilities and improving their access to essential services, economic opportunities, and civic participation. By examining the role of digital transformation in fostering inclusion, this research seeks to identify the key conditions under which digital policies can effectively bridge social inequalities and contribute to a more equitable society.*

To this end, the study tests the following research hypothesis:

RH: *The digitalization of public services reduces social exclusion.*

Methodology. *To examine whether digitalization policy is related to a reduction in social exclusion, we compare levels of social inclusion in Italy and Switzerland, adopting the Difference-in-Differences (DiD) methodological approach. This method is widely used in social sciences for causal inference and evaluation of public policies (Fredriksson and Oliveira, 2019; Furquim et al., 2019). It allows to compare changes over time between a treatment group and a control group, attributing the observed "differences in differences" to the effect of the implemented policy (Stuart et al., 2014).*

Italy, being the European country with the highest investment in digitalization policies, represents a case of "natural experiment". To estimate the causal effects of this intervention, the Italian areas will be considered as the "treatment group", while the Swiss ones, where similar policies have not been implemented, will serve as the "control group", setting 2021 as the treatment year, i.e. the year in which the investments were made. To ensure maximum comparability between the two countries, the analysis is conducted at the regional level. For Italy, only the northern regions are included in the analysis (rather than the entire country), since they share similar demographic and socioeconomic characteristics to the Swiss ones, which are considered as a whole. This approach increases the precision of our estimates of the effects of digitalization policies.

Furthermore, to deepen the analysis, we take into account the intensity of investments in the different Italian regions. Indeed, as highlighted by the report of the Agency for Digital Italy (AGID), investment levels vary significantly across the country, which in turn affects the effectiveness of digitalization initiatives. Therefore, we extend the DiD model to incorporate treatment intensity and change the perspective from a simple binary approach to one that also considers continuous treatments or variable levels of exposure (Callaway et al., 2021). This adaptation allows for a more careful comparison of effects between groups with different levels of exposure, enriching the causal framework (Callaway et al., 2021; Hersche & Moor, 2020; Yanagi, 2022). It then becomes possible not only to measure the average effect of digitalization on social inclusion, but also to estimate its incremental effect at higher levels of investment. The developed methodology is therefore able to determine whether higher investments lead to higher benefits, ensuring a comprehensive view of the intensive impacts of digitalization on social inclusion.

The model structure is defined as follows:

$$y_{it} = \alpha_{it} + \delta_t + \beta\,(TI_{it} * d_t) + \varepsilon_{it}$$

The dependent variable "y_{it}" represents the outcome of social exclusion, given region "i" and year "t". The model also includes a regional fixed effect "α_{it}" that captures stable and unobservable characteristics relevant to each region (such as pre-existing structural differences) that may influence levels of social inclusion independently of digital

investment. We consider a temporal fixed effect "δ_t" to account for year-specific variation and to capture phenomena common to all regions, such as national economic or political fluctuations, that may influence social inclusion independently of digital investments.

The coefficient "β" measures the effect of treatment intensity in the post-intervention period and describes how social inclusion changes for each additional unit of investment per capita.

Treatment intensity ("TI_{it}") instead represents the level of digital investment in region "i" in year "t", while the variable "d_t" is equal to 1 in the years following the implementation of the digitalization funds (after 2021) and 0 for the previous years, thus distinguishing the effects observed before and after the start of the treatment. Finally, the error term "ε_{it}" captures all the random factors that influence the outcome but are not explicitly included in the model, varying across regions and years and capturing the unexplained part of the variability.

To assess the levels of social exclusion, we selected three key indicators identified in the literature, capable of capturing different dimensions of the phenomenon and providing an overall view of socio-economic conditions (Atkinson et al., 2002; Giambona & Vassallo, 2014). The data used are public and provided by Eurostat and Ardeco, and they have been summarized in Tab.1.

The first indicator is "At risk of poverty or social exclusion (AROPE)", which combines monetary poverty, material deprivation and low participation in the labor market (Atkinson & Marlier, 2010). This data offers a broad and integrated perspective, useful for understanding economic difficulties and barriers to inclusion, helping to measure the overall level.

The second indicator is the "Percentage of people in households with very low labor market participation", which measures the percentage of individuals belonging to households with reduced work activity. Such families, according to the literature, are particularly vulnerable to social exclusion (Ward & Özdemir, 2013).

Finally, we consider the "Unemployment rate for the population aged 15 to 74", a central variable to measure social inclusion, since the lack of work often promotes social isolation and marginalization (Gallie, 1999).

Tab. 1: Descriptive statistics for Social Exclusion

	Switzerland			**Norh of Italy**		
	Obs.	Mean	S.D.	Obs.	Mean	S.D.
Social exclusion indicators						
At Risk of Poverty or Social Exclusion	63	19.34	5.83	81	14.85	3.90
People in Households with Very Low Labor Market Participation	63	5.69	2.1	81	5.43	2.21
Unemployment	63	4.76	1.60	81	6.19	1.88

Source: our elaboration

Results. *The results of our DiD analyses are presented in Tab. 2, which reports estimates for three key indicators of social exclusion. Overall, the results suggest that regions that have undertaken digitalization policies have experienced a reduction in social esclusion outcomes compared to untreated regions. Starting with the effect of digitalization on "At Risk of Poverty or Social Exclusion", the DiD estimates indicate that digitalization policies are associated with a reduction in the share of individuals at risk of poverty or social exclusion by approximately 1.624 (95% CI [-3.113, -0.1345]). This result is statistically significant, supporting the hypothesis that digitalization investments contribute to a decline in social exclusion.*

When examining labor market participation, the results indicate a possible reduction in the share of people in households with very low labor market participation, with an estimated coefficient of -0.324 (95% CI [-1.686, 1.039])

Turning to the impact on unemployment, the results show a significant association between digitalization investments and lower unemployment rates. The estimated coefficient for unemployment is -1.328 (95% CI [-1.675, -0.980]), and the effect is statistically significant.

Tab. 2: Difference-in-differences estimates

	Social Exclusion		
	At Risk of Poverty or Social Exclusion	**People in Households with Very Low Labor Market Participation**	**Unemployment**
D estimate	-1.624	-.324	-1.328
	[-3.113, -.134]	[-1.686, 1.039]	[-1.675, -.980]
N	144	144	144
Unit effects	Yes	Yes	Yes
Time effects	Yes	Yes	Yes

Source: our elaboration

Tab. 3 presents estimates based on treatment intensity, further confirming that higher levels of digitalization investments are associated with reductions in social exclusion indicators. The effect of digitalization intensity on the risk

of poverty or social exclusion is estimated at -0.086 (95% CI [-0.162, -0.0106]), with statistical significance, suggesting that the extent of digitalization investment plays a meaningful role in reducing social exclusion.

For labor market participation, the estimated coefficient is -0.017 (95% CI [-0.093, 0.059]).

The estimates for unemployment show a consistent and significant effect of digitalization intensity. The coefficient is -0.071 (95% CI [-0.087, -0.054]), and the effect is statistically significant, providing further evidence that digitalization contributes to reducing unemployment.

Tab. 3: Treatment intensity estimates

	Social Exclusion		
	At Risk of Poverty or Social Exclusion	**People in Households with Very Low Labor Market Participation**	**Unemployment**
Treatment intensity	-.086	-.017	-.071
	[-.162, -.011]	[-.093, .059]	[-.087, -.054]
N	144	144	144
Unit effects	Yes	Yes	Yes
Time effects	Yes	Yes	Yes

Source: our elaboration

All models include unit and time fixed effects, allowing us to control for time-invariant and region-specific characteristics.

Research limitations. *This study presents some limitations that should be acknowledged. First, the reference period of the analysis may be relatively short, potentially limiting the ability to capture the long-term effects of digitalization policies on social inclusion. Digital transformation is a complex process that unfolds over time, and its full impact may only become evident in the longer run. Second, the study relies exclusively on quantitative indicators, which, while providing robust empirical evidence, may overlook qualitative aspects that could offer a deeper understanding of the mechanisms driving digital inclusion. Future research could address these limitations by extending the observation period and integrating qualitative methods, such as interviews or case studies, to complement the quantitative findings and provide richer insights for shaping more effective public policies.*

Managerial implications. *The findings of this study contribute to the growing body of literature examining the relationship between the digitalization of public services and social inclusion. In particular, the results provide empirical evidence that Italian regions with higher investments in digital technologies have experienced a reduction in social exclusion. However, the effectiveness of these investments depends on how they are allocated, as digital transformation alone is not sufficient to promote inclusion.*

According to Amartya Sen's Capability Approach (1999), access to digital technologies must be accompanied by the necessary tools and skills to enable individuals to fully exploit their potential. Without this support, digitalization risks reinforcing existing inequalities and widening the digital divide rather than reducing it. In this regard, Thijssen and Van Dooren (2016) highlight that certain digital platforms tend to favor younger populations, unintentionally creating barriers for older individuals and thereby exacerbating generational disparities. To address these challenges, policymakers should prioritize investments in digital literacy programs for vulnerable groups and in ICT infrastructures that ensure equitable access to digital services (Okunola et al., 2017; Petrović et al., 2012).

Moreover, consistent with the theoretical framework adopted in this study, Berg et al. (2020) emphasize that citizens' engagement with digital processes is not solely dependent on technology availability but also requires effective communication and inclusive strategies. In regions characterized by low digital literacy, users may prefer traditional service delivery channels, making a multi-channel approach essential. For instance, combining mobile platforms, websites, and physical access points can facilitate a smoother digital transition and prevent exclusion (Rodriguez Müller et al., 2021; Sharma and Mishra, 2017). Consequently, regions with lower levels of digital skills could benefit from hybrid solutions that integrate both digital and offline services.

Beyond access and usability, for digitalization to have a meaningful impact on social inclusion, individuals must be able to translate digital technologies into tangible economic and social benefits (Colding et al., 2024; Bose, 2016). This highlights the importance of an enabling environment where digital tools can be effectively leveraged. Such an environment requires robust technological infrastructure, widespread digital literacy, and inclusive service design to ensure that digital transformation fosters an equitable and inclusive society (Britz et al., 2013; Hillerbrand et al., 2019).

Originality of the paper. *This study provides a novel contribution to the literature by adopting a Difference-in-Differences methodology with treatment intensity, an approach that enhances the ability to establish causal relationships between digitalization investments and social inclusion. While previous studies have explored the impact of digital transformation on social outcomes, most have relied on descriptive or cross-sectional analyses, limiting their explanatory power. By integrating treatment intensity, this study moves beyond the traditional binary distinction between digitalized and non-digitalized regions, offering a more precise understanding of how varying levels of investment influence social exclusion.*

From a theoretical standpoint, this study also advances the discussion by applying Amartya Sen's Capability Approach (1999) to digitalization policies. The analyses suggest that while digital access is a necessary condition for

inclusion, it must be accompanied by enabling factors such as digital literacy programs, inclusive service design, and targeted policies to prevent the exacerbation of social inequalities.

By addressing these gaps, this study contributes both methodologically and conceptually to the academic debate on the social impact of digitalization strategies.

Keywords: *Digitalization, Social Inclusion, Difference-in-Differences, Public Services, EU Next Generation.*

Declaration: This is a work-in-progress.

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“A Systematic Literature Review on The Impact of AI, Innovation, and Digitalisation on Airport Passenger Experience”

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Abstract

This study examines how AI, digitalisation, and innovation are transforming the passenger experience in airports. The paper conducts a systematic review of 32 academic articles to identify key technological developments, such as biometric check-ins, AI-enabled services, and IoT applications, that are reshaping the airport customer journey. These innovations aim to improve efficiency, reduce wait times, and enhance personalization. However, their adoption also presents challenges, including data privacy concerns, cybersecurity risks, and regulatory inconsistencies. The findings are organised into thematic areas-biometric technology, AI-driven personalisation, touchless travel, baggage handling, data-driven flow management, and sustainability-to provide a structured understanding of current trends and barriers. The paper offers insights for practitioners and policymakers seeking to enhance passenger experience through effective and ethically responsible digital transformation.

Framing of the research. *The airport industry is experiencing a profound transformation, largely driven by the rise of digital technologies, Artificial Intelligence (AI), and an urgent need to improve operational efficiency and passenger satisfaction. This shift comes at a time when global air travel demand is rapidly expanding, passenger traffic is expected to exceed 10 billion by 2050 (Statista), and travellers are increasingly expecting smooth, personalized, and safe journeys. This evolution isn’t new. As early as 2004, scholars like Buhalis anticipated that technological innovation would become a central force in the success of future airport ecosystems. Since then, advances in AI, data analytics, biometric systems, and the Internet of Things (IoT) have begun to reshape how airports operate-both behind the scenes and at passenger-facing touchpoints (Jiang et al., 2023; Halpern et al., 2021). Today, AI supports predictive analytics and personalization, helping airports anticipate passenger needs and deliver targeted services. Digitalisation enables real-time information flow, from mobile wayfinding tools to automated check-ins, while biometric technologies accelerate security and boarding processes. These changes not only improve efficiency and reduce wait times and congestion (Heracleous & Wirtz, 2006), but also contribute to creating more seamless and emotionally satisfying experiences (Chen et al., 2015; Holz et al., 2023). At the same time, these technologies introduce new tensions and challenges. Concerns about data privacy, algorithmic bias, cybersecurity vulnerabilities, and digital exclusion continue to surface, particularly as personal data becomes more integral to airport operations (Morosan, 2012; Milbredt et al., 2022; Mwesiumo et al., 2023). Moreover, not all travellers are equally comfortable with automation-many prefer human interaction, especially those who are less tech-savvy or who face accessibility barriers (Petrie et al., 2014; Castro et al., 2010). For airport operators, the stakes are high. Embracing innovation is no longer optional, it’s a competitive necessity. Beyond improving the flow of passengers, these technologies enable airports to strengthen their non-aeronautical revenue streams, support environmental goals, and differentiate themselves in a fast-changing market (Pereira et al., 2021; Weisser, 2024). But to fully unlock these benefits, airports must take a strategic and ethically grounded approach to digital transformation. In this context, the present study seeks to understand how AI, innovation, and digitalisation are shaping the modern airport passenger experience. Drawing on a systematic literature review of recent academic research, the paper identifies key technologies and application areas, while highlighting both the benefits and the critical challenges associated with their implementation.*

Purpose of the paper. *This paper investigates the transformative role of Artificial Intelligence (AI), digitalisation, and innovation in shaping the airport passenger experience. Through a systematic review of 32 peer-reviewed academic articles, the study explores how these technologies are being implemented across various stages of the passenger journey-from check-in and security to baggage handling and boarding.*

The goal is to map the key trends, applications, and implications of these innovations on operational efficiency, service quality, emotional engagement, and passenger satisfaction. In particular, the study highlights how biometric systems, IoT infrastructures, AI-powered personalization, and touchless solutions contribute to streamlining airport processes and enhancing comfort and safety. Beyond identifying functional benefits, the paper also explores ethical, regulatory, and experiential challenges-such as data privacy concerns, cybersecurity vulnerabilities, and digital exclusion-which may hinder successful adoption. Special attention is given to the post-pandemic context, where hygiene, speed, and personalization have become central to traveller expectations.

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By offering a structured synthesis of current knowledge, the paper supports airport operators, technology providers, and policymakers in making informed, inclusive, and future-oriented decisions about digital transformation in aviation

Methodology. *The study is based on a Systematic literature review, guided by defined criteria for the inclusion of relevant research materials. These criteria include considerations such as language, topical relevance, keyword alignment, and the overall quality and substantive content of the materials used. To begin the literature search, the Scopus.com server was accessed in December 2024. To delineate the scope of the field investigation, keywords closely related to the central theme of the research were used. The search string adopted was: ("Innovation" OR "Artificial intelligence" OR "AI" or "Digital*") AND ("Aviation" OR "Air Transport" OR "Air Transportation" OR "Airport" OR "Airport operation*" OR "Airport marketing") AND ("Passenger Experience" OR "Customer Satisfaction" OR "Service Quality" OR "Safety" OR "Security" OR "Operational Efficiency" OR "Touchpoint" OR "Customer experience" OR "Customer").*

The use of the logical operator "AND" between two keywords mandated the presence of both terms in each retrieved item, while the use of "OR" indicated that either one or both keywords would feature in the retrieved articles.

The criteria of the results were selecting scientific contributions in English, given the prevalence of English-language publications in the field. Furthermore, the search was delimited to the disciplinary domains of "Business, Management and Accounting" and "Economics, Econometrics and Finance" to ensure relevance and coherence with the research focus. The initial search on Scopus returned 327 results. After applying disciplinary filters, 185 articles remained. Among these, only articles published in top-tier academic journals, specifically those listed as "ANVUR Classe A", or highly relevant niche journals in the aviation and digital innovation domains, were considered for further analysis. A careful reading of titles, abstracts, and keywords led to a selection of 77 articles relevant to the research scope. These were then read in full and, 45 were excluded due to insufficient alignment with the study's focus, resulting in a final selection of 32 articles closely related to the research topic.

In line with best practices for systematic reviews, the selection process was conducted following the PRISMA 2020 guidelines (Page et al., 2021). This approach ensured a clear and replicable methodology, articulated across four phases: identification of records, screening based on titles and abstracts, eligibility through full-text assessment, and final inclusion of relevant contributions.

- *Identification: 327 records were retrieved from Scopus.*
- *Screening: After applying disciplinary filters, 185 records remained. Of these, 108 were excluded after reviewing titles, keywords, and abstracts.*
- *Eligibility: 77 full-text articles were assessed for eligibility. 45 were excluded due to limited relevance to the research question.*
- *Inclusion: 32 peer-reviewed articles were selected for the final analysis.*

PRISMA Flow Diagram

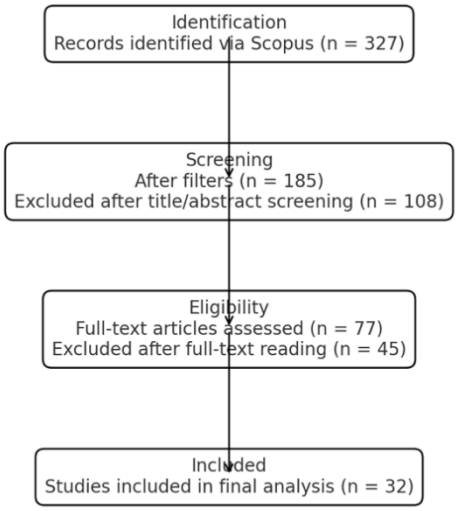

Figure 1 PRISMA Flow Diagram illustrating the selection process of academic articles included in the systematic literature review. From an initial set of 327 records retrieved from Scopus, a final sample of 32 peer-reviewed studies was selected following screening and eligibility assessment.

Results. *The integration of Artificial Intelligence (AI), innovation, and digitalisation has profoundly transformed the passenger experience in the aviation industry. These technologies have not only streamlined operational processes but also enhanced the overall journey for passengers, making it faster, safer, and more personalized (Birkebak M. & Kipp D., 2020). This section synthesises findings from 32 articles to explore how AI, innovation, and digitalisation impact passenger experience across various stages of the journey. Interestingly, the reviewed studies were predominantly*

conducted in the U.S.A., Germany, and the U.K. and a steady growth in publications over the past decade, peaking in 2024, reflects the increasing academic attention to this emerging topic. The results are organised into thematic clusters, each addressing a specific dimension of the passenger experience, from check-in and security to baggage handling and sustainability. By examining these themes, this section highlights the transformative potential of these technologies while addressing the challenges that must be overcome to ensure their successful adoption.

Biometric Technology: Streamlining the Passenger Journey

Biometric technology has emerged as a cornerstone of modern airport management, significantly enhancing the efficiency (Miyamoto, 2023) and security of passenger processing. Studies consistently highlight that biometric systems, such as facial recognition, voice recognition, and fingerprint scanning, reduce wait times and streamline check-in, security, and boarding processes (Negri et al., 2019; Cornacchia et al., 2020). For instance, Negri et al. (2019) found that 82.94% of passengers expressed willingness to adopt biometric check-in systems, citing time efficiency and ease of use as key drivers of acceptance. Similarly, Cornacchia et al. (2020) demonstrated that voice biometrics at Milano Linate Airport were well-received, with passengers appreciating the system's ability to prevent unauthorised access while maintaining operational efficiency. However, the adoption of biometric technology is not without challenges. Privacy concerns remain a significant barrier, as passengers worry about how their biometric data is stored and used (Morosan, 2012; Duman, 2019). Morosan (2012) found that while perceived usefulness and security were strong predictors of adoption, privacy concerns and legal uncertainties around data ownership hindered widespread acceptance. Duman's (2019) experiment at Helsinki Airport further highlighted this tension, revealing that while passengers rated the ease of use of facial recognition technology highly (4.75/5), safety ratings for data submission were lower (4.1/5). These findings underscore the importance of transparent data handling policies and clear communication to build passenger trust. The integration of biometric technology also raises questions about the balance between automation and human interaction. Duman (2019) emphasised the value of a "machine + human" approach, where technology enhances rather than replaces human interaction. This approach not only improves efficiency but also ensures that passengers feel comfortable and supported throughout their journey. For instance, staff at Helsinki Airport reported that the system was "easy to use, fast, and reliable," suggesting that human oversight can mitigate potential issues and enhance the overall passenger experience.

AI-Driven Personalisation: Enhancing Emotional Engagement

AI has transformed customer service in airports by providing personalised and efficient solutions that cater to individual passenger needs. AI-powered tools, such as chatbots, virtual assistants, and personalised recommendation systems, have become integral to the modern passenger experience. Ku (2024) examined the role of AI services in enhancing customer service competencies, finding that passengers who perceived AI services as warm, empathetic, and friendly were more likely to feel emotionally connected to the service. Holz (2023) similarly found that emotionally intelligent AI interactions had a measurable impact on passenger satisfaction, particularly in stressful contexts such a flight delays or missed connections. His study emphasized that even small cues of empathy and warmth in AI interfaces could strengthen trust and engagement. This emotional connection directly influenced their satisfaction and willingness to continue using AI services. Zaoui et al. (2024) highlighted the use of AI chatbots and virtual assistants in providing real-time information and personalised recommendations. These tools reduce passenger stress by offering timely updates and tailored services, such as gate changes or dining options. For example, AI-driven systems can analyse a passenger's travel history and preferences to suggest relevant retail or dining options, enhancing the overall travel experience (Gould, 2019). The study also noted that AI-driven personalisation enhances passenger loyalty by creating a more engaging and satisfying journey. Moreover, AI-powered systems can predict passenger needs and proactively address potential issues understanding passenger emotional behaviour (Hinterholzer & Garcia-Alonso, 2018). For instance, AI can analyse flight data to anticipate delays and automatically rebook passengers on alternative flights, reducing stress and inconvenience. This proactive approach not only improves operational efficiency but also enhances passenger satisfaction by demonstrating a commitment to customer care. Inversini (2017) explored the role of mobile devices in shaping the passenger experience, noting that passengers rely heavily on digital tools for tasks such as checking travel documents, luggage requirements, and transportation arrangements. AI-powered mobile apps can provide personalised recommendations and real-time updates, further enhancing the passenger experience.

Digitalisation and Touchless Travel: Restoring Confidence in the Post-Pandemic Era

The COVID-19 pandemic accelerated the adoption of touchless technologies, which have since become a cornerstone of the passenger experience. IoT-enabled touchless processes, such as contactless check-in, boarding, and health monitoring, have restored passenger confidence by reducing physical contact and enhancing hygiene. Chand et al. (2024) identified these technologies as critical for rebuilding trust in air travel, particularly in the post-pandemic era. Touchless interactions have become an expected standard in the modern travel experience, and airports that fail to adopt these technologies risk losing customer confidence. Weisser (2024) reinforced this by showing that while touchless technologies significantly improved passenger's perceptions of hygiene and convenience, many travellers were unsure how their personal data, particularly health related, was being handled. This highlights the importance of clearly communicating privacy protocols to maintain trust in digital systems. Macnaughton (2022) highlighted the role of indoor air quality (IAQ) monitoring in restoring passenger confidence. A survey revealed that 67% of respondents would feel safer in airports with visible IAQ monitoring. This technology not only addresses health concerns but also enhances the overall passenger experience by creating a more comfortable and reassuring environment. Additionally, smart glass technology

was found to improve passenger comfort by regulating temperature and reducing glare, contributing to a healthier and more pleasant travel environment. The shift towards touchless travel has also driven innovations in passenger flow management. For example, automated boarding gates and self-service kiosks reduce the need for physical interaction with staff, allowing passengers to complete processes independently and efficiently. These technologies not only enhance safety but also improve the overall travel experience by reducing wait times and streamlining processes. Yildiz, Aydemir, and Kurnaz (2024) detailed the comprehensive deployment of IoT at Istanbul Airport, where 107 LoRaWAN IoT gateways were installed to monitor energy usage, water management, and operational processes. This IoT infrastructure enabled real-time data collection and analysis, improving operational efficiency and passenger services; IoT sensors monitored the status of 18,000 passenger outlets and 62 electric buggies, ensuring that amenities were functional and available, directly contributing to passenger satisfaction.

Innovations in Baggage Handling: Reducing Stress and Improving Efficiency

Baggage handling is a critical aspect of the passenger experience, and innovations in this area have significantly improved satisfaction. Singh (2023) found that technologies like RFID and GPS-enabled bag tags reduce mishandled luggage and improve tracking accuracy. Automated baggage systems, such as cross-belt sortation systems, minimise delays and operational disruptions, ensuring a smoother passenger journey. The COVID-19 pandemic exacerbated challenges in baggage handling due to manpower shortages, emphasising the need for automation and contactless processes. Automated systems not only enhance efficiency but also reduce passenger stress by ensuring timely and accurate baggage delivery. For example, RFID-enabled bag tags allow passengers to track their luggage in real-time, providing peace of mind and reducing anxiety about lost or delayed bags. Rauch and Hen (2024) highlighted the implementation of ApronAI at Ljubljana Airport, an AI-powered system that monitors aircraft turnaround processes in real-time. This system proactively identifies delays and inefficiencies, enabling immediate intervention to reduce ground delays. The study noted that ApronAI's predictive algorithms demonstrated high accuracy, contributing to long-term operational improvements and sustainability goals by reducing fuel consumption and CO_2 emissions.

Data-Driven Passenger Flow: Optimising the Journey

Big data and AI have transformed passenger flow management by enabling predictive analytics and real-time decision-making (Ørsted, 2019). Malik (2023) detailed how Phoenix Sky Harbor International Airport used data from 57 systems to optimise passenger flow and capacity management. By creating detailed passenger arrival profiles, the airport could predict congestion and proactively manage terminal spaces, reducing bottlenecks and wait times. Similarly, Papagiannopoulos (2018) demonstrated how advanced data analytics could be used not only to predict congestion but also to segment passengers by behaviour and service need. This allowed for more adaptive crowd control and better alignment of staffing with actual passenger demands. Zaoui et al. (2024) highlighted the use of machine learning models to forecast passenger behaviour and optimise resource allocation. Such predictive tools allow for proactive resource allocation, ensuring a smoother and more efficient journey. For example, AI can analyse historical data to predict peak travel times and allocate staff and resources, accordingly, reducing delays and improving the overall travel experience. Poulsen, Motaghiani, and Kolind (2022) provided a case study of Copenhagen Airport's transition to a data-driven IT platform, which enabled real-time data capture and analysis. This platform improved decision-making for flight operations and resource allocation, enhancing the passenger journey through personalised services and sustainable growth.

Sustainability and Health-Focused Innovations: Aligning with Passenger Values

Sustainability initiatives have become increasingly important in enhancing the passenger experience. Pereira et al. (2021) identified sustainable growth and environmental focus as key drivers of innovation in aviation. Technologies like sustainable aviation fuels (SAF) and electric aircraft reduce carbon emissions and noise levels, aligning with passenger values.

Macnaughton (2022) highlighted the role of environmental sensing and smart glass technology in improving passenger health and comfort. Smart glass, for example, enhances sleep duration and cognitive performance while contributing to natural disinfection through UV-filtered daylight. These innovations not only improve passenger comfort but also demonstrate a commitment to sustainability and health, enhancing the overall travel experience. Jiang, Tran, and Williams (2023) explored the role of machine learning and mixed reality in promoting sustainability. Machine learning applications in predictive maintenance and autonomous systems have reduced fuel consumption and operational costs, while mixed reality has enhanced training efficiency and maintenance accuracy, contributing to long-term sustainability.

Challenges and Barriers to Adoption

Despite the benefits, several challenges hinder the adoption of AI, innovation, and digitalisation in aviation. Milbredt et al. (2022) highlighted cybersecurity risks as a significant concern, particularly for systems involving biometric data. The study emphasised the need for advanced security measures to protect sensitive data and ensure system resilience. Morosan (2012) and Cornacchia et al. (2020) identified privacy concerns as a major barrier to the adoption of biometric systems. Passengers expressed fears about data misuse and unauthorised access, underscoring the need for transparent data handling policies. Inversini (2017) noted that some passengers prefer traditional processes over technology-driven solutions, particularly older travellers or those with limited technological familiarity. This resistance highlights the importance of balancing innovation with user preferences. Mwesiumo et al. (2023) found that perceived benefits, such as convenience and personalised offers, are crucial for overcoming privacy concerns. Passengers are more willing to share

personal data if they perceive clear value in the exchange, emphasising the importance of designing user-friendly digital services that transparently communicate benefits.

Research limitations. *Despite providing a comprehensive analysis of AI, innovation, and digitalisation in passenger experience, this study has certain limitations. First, the research is based on existing literature, which may not fully capture emerging trends and real-time industry developments. As aviation technology evolves rapidly, newer solutions may surpass the findings presented in this review. Additionally, this study primarily draws insights from airports in developed economies, where digitalisation initiatives are more advanced. The adoption of AI-driven passenger experience enhancements may differ in developing regions due to resource limitations, regulatory barriers, or varying passenger expectations. Future research should include empirical case studies and primary data collection to examine passenger perceptions and the effectiveness of AI-driven solutions in different geographical contexts.*

Managerial implications. *The findings of this study offer significant insights for airport operators, technology providers, and policymakers focused on improving passenger experience. AI-powered automation, biometric check-ins, and real-time data analytics provide an opportunity for airports to reduce congestion, improve security measures, and enhance overall traveller convenience. Personalized passenger engagement through AI-driven platforms allows airports to offer tailored services, dynamic pricing for airport amenities, and customized notifications for flight updates and terminal navigation. IoT-enabled environmental monitoring systems contribute to passenger comfort by optimizing lighting, air quality, and crowd management, creating a more pleasant airport experience. However, for successful adoption, airports must address concerns related to privacy, cybersecurity, and data governance. Regulatory frameworks should ensure ethical AI usage, transparent data collection practices, and robust cybersecurity strategies to protect passenger information. Moreover, investment in staff training and passenger awareness initiatives can ease the transition toward AI-enhanced processes (Newbold, 2019). By embracing AI, innovation, and digitalisation, airports can create passenger-centric environments that optimize convenience, security, and satisfaction, reinforcing their competitiveness in an evolving aviation landscape.*

Originality of the paper. *This paper contributes to the existing body of knowledge by providing a comprehensive and structured review of AI, innovation, and digitalisation within the context of passenger experience at airports. While previous studies have examined individual technological applications, this research synthesizes multiple dimensions of digital transformation to offer a holistic perspective. The originality of this study lies in its systematic approach to analysing both the benefits and challenges associated with AI-driven passenger experience enhancements. Unlike prior studies which mainly focus on technological feasibility, this paper emphasizes managerial, regulatory, and ethical considerations that influence the adoption and success of these innovations. Furthermore, it bridges the gap between theoretical research and practical applications by providing actionable insights for airport operators, policymakers, and technology developers. By integrating recent findings, evaluating the impact of emerging digital trends, and identifying key challenges, this study advances the discourse on how AI and digitalisation can be effectively harnessed to transform passenger experiences in the aviation industry. Future research can build on this foundation by conducting empirical studies, exploring regional variations in adoption, and assessing the long-term effects of AI-driven airport innovations.*

Key words*: AI, Digitalisation, Innovation, Passenger Experience, Airports, Aviation.*

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Link between digital technologies and Sustainable Development Goals in service businesses: a systematic literature review

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Abstract

The Sustainable Development Goals (SDGs) promoted by the United Nations provide a framework to promote balanced development that considers environmental, social and economic sustainability (Trane et al., 2023; Sabbagh et al., 2023). Progress towards the achievement of the SDGs must be analyzed considering the downsizing of the industrial sector in favor of the growth of the tertiary sector, also as a result of the development of digital technologies.

The aim of this work is to provide a systematization of knowledge on the link between digital technologies and the achievement of the SDGs for companies in the tertiary sector. To achieve the research objective, we used a systematic literature review, a methodology that allowed us to conceptualize the existing theory on the topic.

The results of this work highlight the central role of digital technologies in promoting the achievement of the SDGs for tertiary sector companies. They also highlight the elements to be paid attention to in the application of digital technologies functional to the achievement of the SDGs in tertiary sector firms. Future research should further investigate the ways in which these technologies can be implemented effectively, analyzing challenges and opportunities related to their diffusion.

Framing of the research. *Tertiarization is a process, typical of advanced economies, which consists in the progressive lower incidence of the industrial sector on the formation of Gross domestic product (GDP) and employment, to the advantage of the tertiary sector, in particular the advanced one which includes services to production and businesses, characterized by the continuous development of information and computer technologies.*

The structural change of the economy in favor of the tertiary sector is much studied by scholars especially in relation to the consequences it produces from an environmental point of view, a consequence of a growing sensitivity to the issues of environmental sustainability and awareness of the need to reduce greenhouse gas emissions in order to reach the environmental objectives set by the various national and supranational regulations on the matter.

In literature, the service sector is sometimes considered less harmful to the environment than the primary and secondary sectors. In this regard, Romm (1999) and Lange (2020) consider digital technologies and tertiarization as instrumental to achieving the decoupling between economic growth and energy consumption. In economic theory, the non-materiality of services explains their lower negative impact on the environment and their lower energy consumption compared to industry (Fourcroy et al., 2012; Arrow et al., 1995; Bernardini et al., 1993). Gadrey (2010), on the contrary, tends to consider tertiarization not necessarily positive for the environment. Developed countries are generally characterized by an economy dominated by services and a high demand for energy. Camara (2022), in assessing the environmental impact of tertiarization, makes a distinction between absolute and relative tertiarization, defining the former as more harmful to the environment.

Firms in the tertiary sector, as well as those in the primary and secondary sectors, are forced to face the important challenge of achieving a balance between environmental, social and economic sustainability (Ciasullo et al., 2017; Sachs, 2012). The growing sensitivity towards the issues of environmental, social and economic sustainability, thanks to the commitment of national and supranational institutions, has led to the definition of the 2030 Agenda which represents an action program divided into 17 objectives whose achievement is aimed at promoting sustainable development for all (Trane et al., 2023). The Sustainable Development Goals (SDGs) of the 2030 Agenda were introduced for the first time in 2015 to outline a trajectory to follow for a more sustainable future for all.

From a managerial point of view, the Sustainable Development Goals of the 2030 Agenda must be incorporated into the corporate strategy in order to move more quickly towards the achievement of the SDGs (Troisi et al., 2019; Troisi et al., 2022; Oppenheim et al., 2017). It follows that the progressively greater influence on GDP and employment of service

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firms, compared to those in the primary and secondary sectors, must be investigated not only by considering the environmental consequences but by analyzing the impact on all the SDGs, which provide a global framework for each actor that pursues the balance between social, economic and environmental sustainability.

Purpose of the paper. *Tertiarization is a process driven by technological innovation as well as by the evolution of demand. A context characterized by a growing attention to sustainable development issues makes the analysis of the contribution of digital technologies to the sustainable development of companies in the tertiary sector of central importance.*

Camara (2022) and Fourcroy (2012) analyzed the link between tertiarization and sustainable transition. In particular, the relationship between the structural change of the economy, the use of digital technologies and the level of energy consumption of companies was investigated.

To our knowledge, there are no systematic reviews that offer a theoretical systematization on the link between digital technologies and SDGs for tertiary sector firms. This study aims to fill this gap in the literature by analyzing the link between tertiarization and sustainable development goals and investigating the contribution of digital technologies to the sustainable development of tertiary sector firms.

The research questions this work answers are the following:

RQ 1: *What is the current state of knowledge on the link between tertiarization and the SDGs of the 2030 Agenda in the digital age?*

RQ 2: *What is the link between digital technologies and the sustainable development of tertiary sector firms?*

RQ 3: *What could be the future directions of research on sustainable tertiarization and on the link between digital technologies and sustainable development of tertiary sector firms?*

Methodology. *This study uses a systematic literature review. This methodology allows us to address phenomena that are not fully understood, identify problems, themes, patterns, and assist in the conceptualization of theory by guiding future research directions (Massaro et al., 2016; Troisi et al., 2023).*

Preferred Reporting Items for Systematic review and Meta Analysis (PRISMA) 2020 protocol, a rigorous guideline for reporting systematic reviews, was applied.

The bibliographic search was conducted on January 15, 2025 on the Web of Science (WoS) database. The search was performed by using the Boolean expression: "tertiarization OR tertiarisation OR tertiary OR "service industr" AND "sustainab*" AND "digital*". The use of the asterisk (*) allowed a greater completeness of the result provided by the bibliographic search, allowing the inclusion of documents containing variants of the words "industry", "sustainable" and "digital". A filter was used to allow the inclusion of only studies written in English and no exclusion criteria for documents were defined based on publication date rather than document type.*

The studies extracted from the bibliographic search were subjected to a careful manual screening to assess their suitability for inclusion in the analysis or alternatively to be eliminated from the dataset. The scanning was carried out first by reading the title and abstract and then by reading the whole document. The screening of the articles was performed by the authors, who worked autonomously.

Results. *This section provides the results of the analysis of 66 articles focused on the link between digital technologies and sustainable development of tertiary sector enterprises.*

The bibliographic search originally produced 146 documents. The titles and abstracts of 146 articles were examined. Following the screening, 61 documents were excluded as they were not consistent with the research objective. 85 articles potentially eligible for inclusion, after reading the titles and abstracts, were subjected to a full reading. The documents included in the study are 66 (Fig. 1).

From the analysis of the temporal distribution of the studies, it emerged that the scientific production has registered a significant increase since 2016 (Fig. 2). The reason is twofold: firstly, it must be considered that tertiarization as a phenomenon of structural change in the economy is rather recent; secondly, it should be highlighted that only in recent years there has been a growing sensitivity in sustainable development, also as a consequence of the regulatory commitment of national and supranational authorities[5].

The analysis revealed a significant growth in citations from 2020 onwards (Fig. 3). The most influential article is that of Lange et al. (2020), with 574 citations, aimed at investigating the effect of digitalization on energy consumption, followed by the article of Yip et al. (2018), with 190 citations, relating to the analysis of sustainable business models of firms active in the banking services sector. The third most cited article is that of Gregurec et al. (2021), with 105 citations, where an analysis was carried out relating to the technologies most closely monitored by service firms to respond to the challenges posed by Covid-19.

Table 1 shows the ten articles in the sample that obtained the highest number of citations. These results demonstrate that the advent of the pandemic has contributed significantly to the development of research on the topic of the application of digital technologies to tertiary sector firms also due to the need to conceptualize some drivers to address social changes in times of uncertainty (Gregurec et al., 2021).

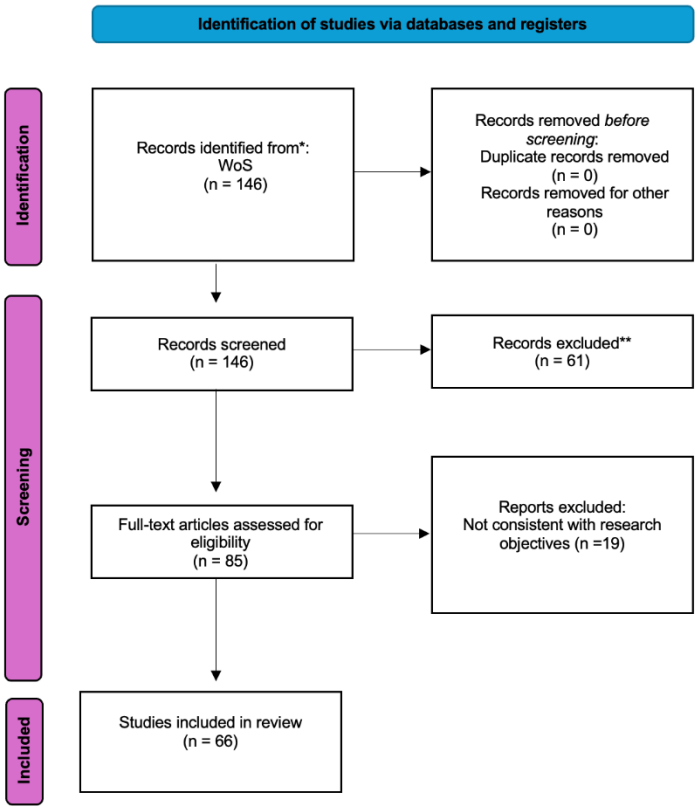
Table 1 also indicates the number of citations per year (CPY), which is given by the ratio between the number of citations and the time elapsed between its publication and the end of the analysis period.

[5] Agreements such as the United Nations Agenda 2030, the Paris Agreement on climate and the European Green Deal have pushed institutions and businesses to adopt more sustainable behaviors from an environmental, social and governance perspective.

With reference to CPY, the most influential article is that of Lange et al. (2020) with a number of citations per year equal to 98.83; the article of Yip et al. (2018) is in second place with an average number of citations per year equal to 23.75; the article of Gregurec et al. (2021) is in third place with 21 citations.

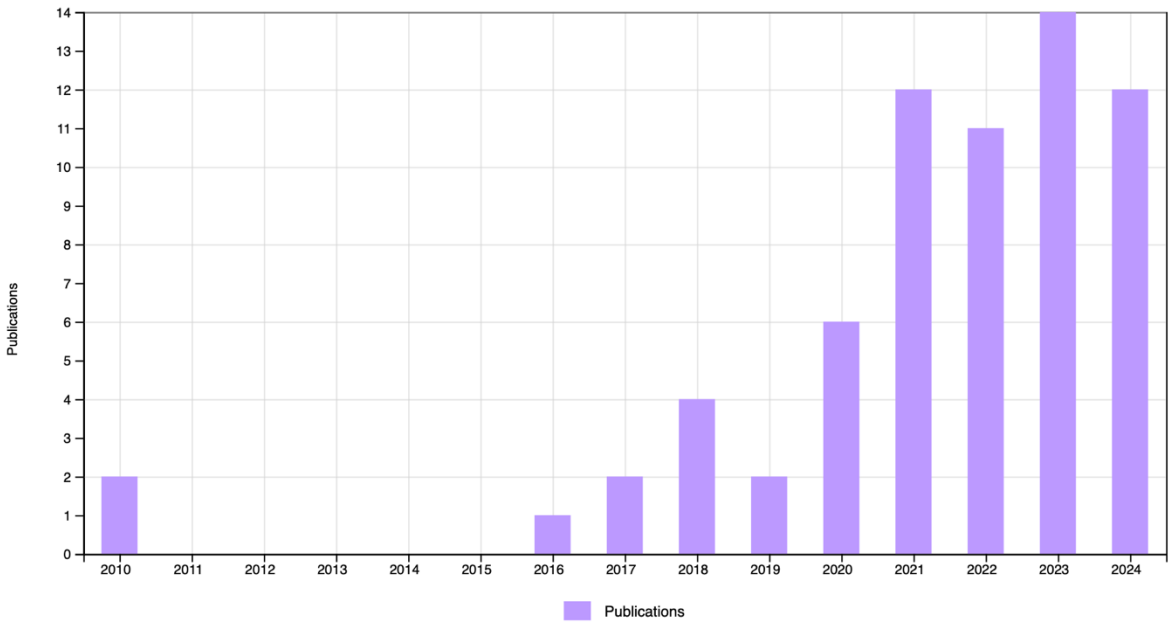
From the analysis of the most influential articles by virtue of the number of citations per year, it emerges that the topic under analysis is investigated in relation to the impact on the sustainable development of service firms but in particular it is paid attention to in reference to the environmental impact deriving from the application of digital technologies to companies in the tertiary sector.

Fig. 1: Flow chart PRISMA 2020



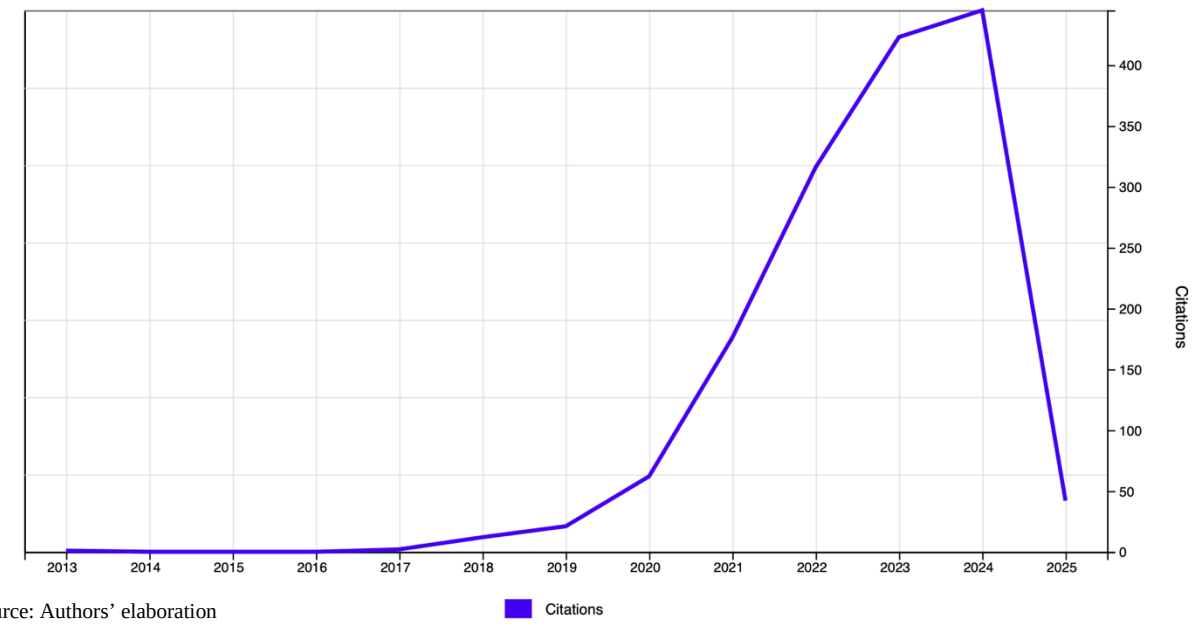
Source: Authors' elaboration

Fig. 2: Temporal distribution of publications



Source: Authors' elaboration

Fig. 3: Time distribution of citations



Source: Authors' elaboration

Tab. 1: The ten most cited articles in the sample

Title	Authors	Source Title	Publication Date	Publication Year	Total Quotes	Average per Year
Digitalization and energy consumption. Does ICT reduce energy demand?	Lange, Steffen; Pohl, Johanna; Santarius, Tilman	ECOLOGICAL ECONOMICS	OCT 2020	2020	593	98.83
Sustainable business model archetypes for the banking industry	Yip, Angus W.H.; Bocken, Nancy MP	CLEANER PRODUCTION JOURNAL	FEB 10 2018	2018	190	23.75
The Impact of COVID-19 on Sustainable Business Models in SMEs	Gregurec, Iva; Tomicic Furjan, Martina; Tomicic-Pupek, Katarina	SUSTAINABILITY	FEB 2021	2021	105	21
Do MOOCs contribute to student equity and social inclusion? A systematic review 2014-18	Lambert, Sarah R.	COMPUTERS & EDUCATION	FEB 2020	2020	98	16.33
Digitalization: An Opportunity for Contributing to Sustainability From Knowledge Creation	Ordieres -Mere, Joaquin; Prieto Remon, Tomas; Rubio, Jesus	SUSTAINABILITY	FEB 2 2020	2020	86	14.33
The impact of natural resource endowment and green finance on green economic efficiency in the context of COP26	Geng, Qianqian; Wang, Ying; Wang, Xiaoqing	RESOURCES POLICY	JAN 2023	2023	43	10.75
Sustainable transition towards greener and cleaner seaborne shipping industry: Challenges and opportunities	Oloruntobi, Olakunle; Mokhtar, Kasypi; Gohari, Adel; Asif, Saira; Chuah, Lai Fatt	CLEANER ENGINEERING AND TECHNOLOGY	APR 2023	2023	40	13.33
The fourth industrial revolution of supply chains: A tertiary study	Barata, Joao	JOURNAL OF ENGINEERING AND TECHNOLOGY MANAGEMENT	APR-JUN 2021	2021	35	7
Energy saving and emission reduction effects of urban digital economy: technology dividends or structural dividends?	Gao, Weilong; Peng, Ying	ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH	MAR 2023	2023	25	6.25
Digital interventions for people living with non-communicable diseases in India: A systematic review of intervention studies and recommendations for future research and development	Hossain, Md Mahbub; Tasnim, Samia; Sharma, Rachit; Sultana, Abida; Shaik, Araish Farzana; Faizah, Farah; Kaur, Ravneet; Uppuluri, Madhuri; Sribhashyam, Mitali; Bhattacharya, Sudip	DIGITAL HEALTH	DEC 2019	2019	19	2.71

The topic under analysis is explored across different thematic areas. Figure 4 shows the ten most important thematic areas by virtue of the number of publications.

The topic of analysis has been explored mainly from the point of view of environmental sustainability. Several scholars have evaluated the environmental impact of the application of digital technologies to firms operating in the tertiary sector (Yao et al., 2023; Lange at al., 2020),

In the field of business, management and economics, several scholars have focused on the analysis of the managerial implications related to the adoption of digital technologies in tertiary sector firms by exploring the benefits for sustainable development by adopting perspectives that go beyond the environmental dimension alone (Lathan et al., 2024; De Caro-Barek et al., 2024; Masakova et al., 2023).

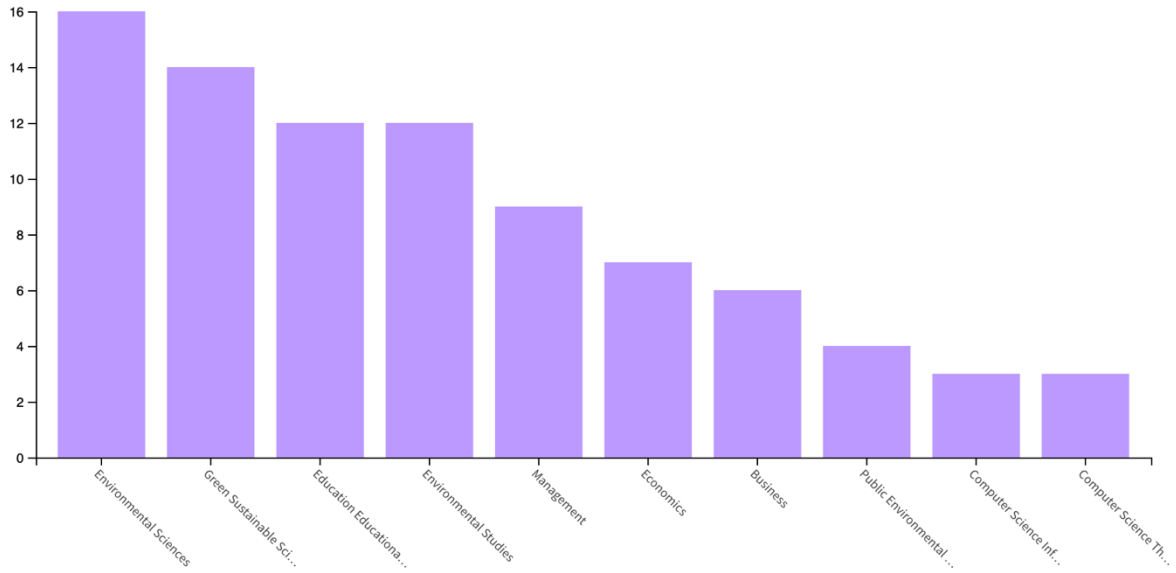
The high emphasis placed on the environmental sustainability of the application of digital technologies to tertiary sector firms is the consequence of the centrality of issues related to climate change and pollution, as well as the growing pressure placed on firms by international agreements and government policies aimed at incentivizing the sustainable transition.

After Covid-19, there has also been a growing awareness towards other dimensions of sustainable development. In particular, studies have focused on how digital technologies applied to tertiary sector firms can facilitate the achievement of the SDGs and enable the creation of sustainable tertiarization.

The articles included in the review, after the descriptive analysis, were explored through content analysis to extract information related to the role of digital technologies in the context of tertiarization.

One of the most discussed topics on the role of digital technologies as drivers of sustainable tertiarization is their connection with the reduction of CO2 emissions of firms operating in the service sector. Yao (2023), Algassim (2023), and Rosa (2023) highlight that the digital transformation of service firms, although not devoid of managerial challenges, is instrumental in reducing CO2 emissions and managing water resources more efficiently, which are fundamental traits for achieving SDG 6 of the United Nations 2030 Agenda. According to Hu (2023), Yip (2018), Oloruntobi (2023) the application of digital technologies to service firms supports business productivity, operational flexibility and energy efficiency, favoring the definition of sustainable business models and consequently the green energy transition, fundamental aspects for the achievement of the sustainable development goal SDG 7. According to Cortes-Murcia (2022) and Gregurec (2021) the application of digital technologies to tertiary sector firms not only makes them more competitive but also reduces the environmental impact of their activation allowing the actors of the system to cooperate more effectively. Gao (2023), Lange (2020), Ali (2024), Lee (2017) have shown that the use of digital technologies favors the environmental sustainability of service firms to the extent that the increase in energy consumption generated by the use of digital technologies is compensated by greater energy efficiency of digitalization. In this regard, it is worth highlighting that efforts towards a green energy transition require an improvement in eco-social literacy (Lázaro Torres et al., 2023).

Fig. 4: The main research areas in the sample



Source: Authors' elaboration

A second topic that emerged concerns the impact of the application of digital technologies to health services to achieve the SDGs. Digital technologies allow for an improvement in healthcare efficiency without compromising clinical outcomes, promote accessibility to care by promoting well-being for all at all ages in line with the provisions of SDG 3 (Lathan et al., 2024). Muhos (2019) and Park (2019) highlight that the application of digital technologies to the health services sector allows for easier and more timely access to the same services, allowing the overcoming of logistical and economic barriers that make access to traditional methods of healthcare delivery more difficult. Digital technologies

promote the transition towards more patient-centered hospital healthcare models, improve access to healthcare and contribute to the sustainability of healthcare systems. Ristow (2022) and Barnett (2022) highlighted the positive impact of the application of digital technologies on enhancing the delivery of health services and their accessibility. Alswailem (2021) highlighted the importance of digital technologies in ensuring that services remain high quality, accessible and sustainable even in contexts of extreme difficulty such as happened with Covid-19 which has put pressure on hospital systems.

A third topic that emerged from the analysis concerns the effects of the application of digital technologies to the educational sector. De Caro-Barek (2024) highlights that the widespread application of digital technologies to the education sector is revolutionizing the entire sector by improving its accessibility, efficiency and sustainability, fundamental pillars to ensure the achievement of SDG 4 of the United Nations 2030 Agenda. Urbanek (2023), Laciok (2021) and Ayman (2020) highlight that a widespread use of digital communication tools in higher education institutions promotes inclusiveness and reduces inequalities in tertiary education. In the post Covid-19 era, an improvement in digital communication skills and a definition of more flexible and dynamic learning paths have been observed. Studies by Maketo (2023), Chigunwe (2022), Lambert (2020) and Adam (2017) have shown that the application of digital technologies to the education sector promotes the diffusion of quality, inclusive and equitable education, stimulating the democratization of access to knowledge at a global level.

A fourth topic concerns the impact of digital technologies on gender equality in tertiary sector firms. Digital technologies play a fundamental role in promoting gender equality, facilitate women's entry into the world of work and improve their employment opportunities, which are key aspects for achieving SDG 5 of the United Nations 2030 Agenda (Masakova et al., 2023). Kashyap (2021) and Zurdo (2022) also recognized the instrumentality of digital technologies in reducing gender inequalities in work contexts, highlighting that the best results are achieved in countries with a developed tertiary sector. Palumbo (2022) highlighted that the application of digital technologies in work contexts is not without risks, these, if not correctly implemented, can generate psychosocial tensions that undermine the health and safety of employees and consequently organizational excellence, for this reason it is necessary to define organizational measures for the health and safety of employees and to curb the disadvantage of digitalization on psychosocial risks.

A final element that emerged from the analysis concerns the use of digital technologies in communication with stakeholders. According to Ayman (2020), digital technologies contribute to improving communication with stakeholders, promoting transparency and stakeholder involvement, which are fundamental aspects for achieving sustainable development. Farhangi (2021) highlighted the importance of digital communication, including through social media, as a tool for resilience towards negative contingencies. Suhanyi (2024) recognized the importance of e-government and of the application of digital technologies to public services as they improve their efficiency, accessibility and transparency.

The cross-sectional analysis of the five thematic strands - 1) the role of digital technologies as drivers of sustainable tertiarization and their connection with the reduction of Co2 emissions in service sector firms, 2) the impact of digital technologies in health servicies to achieve the SDGs, 3) the effects of applyng digital technologies in the educational sector, 4) the impact of digital technologies on gender equality in tertiary sector firms, 5) the use of digital technologies in communication whith stakeholders – confirms how digital technologies are a crucial enabler for the achievement of multiple SDGs. This evidence shows that the use of digital technologies can simultaneously generate environmental, social and economic benefits for companies in the tertiary sector. The positive impact that the use of digital technologies has on operational efficiency in terms of improved productivity, flexibility and speed of processes, as well as the role of enabler of sustainable business models, amply justifies the investment in green technologies.

Despite the clear advantages associated with the digitalization of companies in the tertiary sector, it is also appropriate to highlight the critical issues associated with it and which influence its systemic impact. The lack of widespread digital skills and resistance to organizational change hinder adoption, while the increase in energy consumption associated with data centers and infrastructures generates new environmental risks, if not accompanied by investments in renewable energy. At the same time, digital acceleration in the workplace can trigger psychosocial tensions, particularly in the most vulnerable groups, underlining the urgency of dedicated HR policies.

This study aims to systematize knowledge on the link between digital technologies and the achievement of the SDGs for tertiary sector firms. Given the importance placed by national and supranational bodies in the achievement of the SDGs, we argue that future studies that fall within this line of research should explicitly refer to the reference SDGs to facilitate knowledge sharing and support progress towards their achievement.

The systematization of knowledge on the subject of analysis has also highlighted elements of complexity related to the application of digital technologies to firms in the tertiary sector; with the aim of overcoming the elements that hinder the achievement of the SDGs, the need for further research efforts emerges aimed at investigating the operational elements capable of promoting the integration of digital technologies in the tertiary sector in line with the dictates of the objectives of the 2030 Agenda .

Research limitations. *Systematic literature reviews are designed to provide a fair, unbiased, and systematic solution to a research problem by synthesizing all primary sources relevant to the topic being analyzed. However, readers should be aware of limitations when analyzing the data provided in this article.*

This systematic literature review is based on the analysis of existing research studies and although a careful literature search was conducted to find strictly relevant articles, some relevant documents may not have been included, for example, because not addressing the issues related to SDGs, digital technologies and tertiarization in the title, abstract or keywords.

It should also be considered that the conceptualization of the evidence of the various documents included in the review was characterized by a certain level of interpretation given that there were only a few articles that explicitly addressed the instrumentality of digital technologies in achieving sustainable development for companies in the tertiary sector.

Managerial implications. *The analysis of the 66 studies included in the systematic literature review highlights important managerial and policy implications as a consequence of the central role of digital technologies in promoting the sustainable development of tertiary sector firms.*

In particular, the results suggest important technological, organizational and political challenges.

The high attention paid to the issues of environmental sustainability connected to the application of digital technologies to service firms shows the need to direct investments towards the search for greater energy efficiency of digital technologies in order to promote the reduction of CO2 emissions and accelerate the green transition of firms.

Secondly, the need to adopt adequate organizational policies to enhance the positive effects of digitalization in service companies and promote the establishment of a more inclusive, fair and sustainable development model was highlighted.

A final point that emerged from the analysis concerns the need to define policies aimed at promoting the global accessibility of digital technologies and thus promote the promotion of sustainable development for all.

Ultimately, the study shows that the application of digital technologies in an instrumental perspective to achieve the objectives of sustainable development is not free from elements of complexity, managers will have the task of developing adequate organizational measures to enhance the positive effects deriving from the application of digital technologies and consequently limit the negative effects.

Originality of the paper. *Previous studies have analyzed the link between tertiarization and sustainable transition, particularly the link between the structural change of the economy, the use of digital technologies and the level of energy consumption in companies has been investigated.*

To our knowledge, there are no systematic reviews that provide a theoretical systematization on the link between digital technologies, SDGs and tertiary sector firms.

Key words: *digital technology; tertiary sector; tertiarization; SDGs; sustainability; systematic literature review*

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Governance and Digital Innovation: Redefining the Business Model Canvas

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Abstract

L'integrazione della sostenibilità nei modelli di business rappresenta una sfida cruciale per le imprese, in particolare nel settore bancario, dove la governance assume un ruolo determinante nel bilanciare obiettivi economici, sociali e ambientali. Questo studio propone un'estensione del Triple Layered Business Model Canvas (TLBMC) per includere la dimensione della governance, analizzando anche l'impatto della digitalizzazione. Attraverso un caso di studio, la ricerca sviluppa un framework teorico che collega i principi ESG alle capacità digitali. I risultati mostreranno che una governance solida e trasparente non solo migliora la performance ESG, ma favorisce anche l'innovazione del modello di business, aumentando la resilienza e la competitività dell'impresa. Questo contributo teorico e pratico offrirà nuove prospettive per manager e accademici, suggerendo strategie per una gestione più efficace e integrata della sostenibilità nel settore dei servizi finanziari.

Framing of the research. *La crescente attenzione alla sostenibilità sta esercitando un' elevata pressione sulle aziende, spingendole ad affrontare in modo più attivo le questioni legate a crisi finanziarie, disuguaglianze economiche e sociali, impatti ambientali, scarsità di risorse materiali, domanda energetica e sviluppo tecnologico (Rockström et al., 2009). Queste sfide rappresentano non solo un rischio per le organizzazioni (Tenberg, 1995; Paterson, 2001), ma anche un'opportunità per sviluppare innovazioni sostenibili (Hart, 2005; Adams et al., 2016). Per affrontare con successo queste criticità, le aziende devono integrare soluzioni innovative che siano eco-efficienti ed eco-efficaci, contribuendo così alla conservazione e al miglioramento delle risorse naturali, sociali e finanziarie nel loro core business (Castelló & Lozano, 2011; Rifkin, 2014). Tuttavia, affinché l'innovazione sostenibile abbia un impatto significativo, non è sufficiente introdurre cambiamenti incrementali o limitati a specifici ambiti aziendali ma è necessario un approccio più ampio che coinvolga l'intera organizzazione e i suoi stakeholder (Adams et al., 2016; Nidumolu et al., 2009).*

In questo contesto, la Corporate Social Responsibility (CSR) emerge come uno degli strumenti fondamentali per integrare la sostenibilità nei modelli di business. La CSR rappresenta l'impegno volontario delle aziende nel migliorare la governance aziendale e garantire operazioni trasparenti e responsabili (Cochran, 2007), includendo iniziative filantropiche e strategie che rispondono alle esigenze degli stakeholder, alle questioni ambientali e alle richieste sociali (Cai et al., 2012; Crowther e Aras, 2008). Con l'evoluzione delle sfide sociali e ambientali, la CSR si è progressivamente identificata con la sostenibilità tridimensionale d'impresa, diventando un tema centrale negli studi di management (Sciarelli & Sciarelli, 2018). Le aziende che hanno adottato strategie orientate alla CSR hanno visto un miglioramento nella propria reputazione, nel rafforzamento delle relazioni con clienti e stakeholder, e nella performance aziendale (Du, Bhattacharya e Sen, 2015).

La transizione verso modelli economici sostenibili è sempre più urgente, con le imprese che giocano un ruolo chiave grazie alle risorse e competenze di cui dispongono (Porter & Kramer, 2011). Tuttavia, molte aziende incontrano difficoltà nel raggiungere i propri obiettivi di sostenibilità, poiché i progressi tecnologici in questo ambito sono spesso incrementali. Per superare tali ostacoli, è fondamentale innovare i modelli di business, allineando incentivi e meccanismi di revenue a soluzioni sostenibili (Rashid et al., 2013). Le innovazioni nelle logiche di business sembrano generare rendimenti più elevati rispetto alle innovazioni di prodotto o di processo (Lindgardt et al., 2009). La letteratura evidenzia i numerosi vantaggi che i modelli di business sostenibili offrono alle organizzazioni (Nidumolu et al., 2009; Porter & Kramer, 2011), portando alcuni autori a ritenere che in futuro i modelli di business non sostenibili diventeranno obsoleti. Inoltre, i modelli di business sostenibili offrono vantaggi aggiuntivi come una maggiore resilienza e mitigazione del rischio (Choi & Wang, 2009), oltre a opportunità di diversificazione e co-creazione di valore (Nidumolu et al., 2009; Porter & Kramer, 2011; Tukker & Tischner, 2006). Per questo motivo, molte organizzazioni stanno investendo nell'implementazione di soluzioni sostenibili (Evans et al., 2017).

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Esiste, dunque, un rapporto bidirezionale e interdipendente tra sostenibilità e innovazione: da un lato, la sostenibilità agisce come motore propulsore per lo sviluppo di innovazioni creative nelle organizzazioni; dall'altro, la stessa sostenibilità aziendale richiede una ridefinizione dei modelli di business attraverso approcci innovativi. Questo circolo virtuoso si manifesta nella capacità di generare nuove modalità di creazione, distribuzione e acquisizione di valore che ridefiniscono radicalmente i parametri competitivi (Evans et al., 2017). In questo contesto, l'innovazione diventa uno strumento abilitante per tradurre i principi sostenibili in vantaggio strategico, mentre la sostenibilità funge da catalizzatore per ripensare processi, prodotti e relazioni con gli stakeholder attraverso un approccio olistico.

Numerosi approcci teorici e pratici condividono l'idea che il miglioramento della sostenibilità implichi cambiamenti, innovazioni o adattamenti delle organizzazioni al contesto circostante (Faber et al., 2005). La capacità di innovare nel campo della sostenibilità è oggi una competenza essenziale per le imprese, che possono perseguire sia piccoli miglioramenti incrementali sia innovazioni radicali e dirompenti (Adams et al., 2012). In questo contesto, l'innovazione del modello di business emerge come un meccanismo chiave per integrare la sostenibilità all'interno del business (Jolink & Niesten, 2015).

Per le imprese che desiderano innovare in chiave sostenibile il proprio paradigma di business, il Triple Layer Business Model Canvas (TLBMC) si propone come un efficace strumento operativo. Derivato dal business model canvas di Osterwalder e Pigneur (2010), ampiamente utilizzato per l'innovazione dei modelli aziendali, il TLBMC integra esplicitamente gli impatti ambientali e sociali. Questo framework aggiunge livelli che si allineano con la struttura originale del canvas, permettendo di sviluppare, visualizzare e comunicare modelli di business sostenibili in modo più efficace (Stubbs & Cocklin, 2008). Seguendo il principio della triple-bottom line (Elkington, 1994), il TLBMC rende la creazione di valore economico, ambientale e sociale elementi centrali del modello di business. Questi strati consentono di rappresentare un livello ambientale basato sull'approccio del ciclo di vita e un livello sociale basato sulla teoria degli stakeholder (Abbasnia et al., 2023). Di conseguenza, i tre strati interconnessi, che lavorano sinergicamente (Midgley & Arya, 2022), mostrano visivamente come un'azienda contribuisce alla creazione di valore in tre dimensioni (Stubbs & Cocklin, 2008), in linea con la prospettiva del Triple Bottom Line (Elkington, 1998). Inoltre, sfrutta strumenti come l'analisi del ciclo di vita e la gestione degli stakeholder per connettere le diverse dimensioni della sostenibilità, offrendo una prospettiva strutturata per la creazione di valore che include anche le implicazioni ambientali e sociali (Joyce and Paquin, 2016).

Più specificamente, il Triple Layered Business Model Canvas (TLBMC) ha lo scopo di evidenziare le dinamiche spesso tacite e informali all'interno delle organizzazioni attraverso il concetto di coerenza duale. La coerenza orizzontale si riferisce all'allineamento dei nove blocchi in ciascun canvas, assicurando un allineamento sistemico, poiché ogni blocco contribuisce alla creazione di valore a profondità variabili. La coerenza verticale, invece, riguarda l'interconnessione di ciascun componente all'interno di uno strato con tutti gli altri componenti, consentendo una certa uniformità tra i diversi tipi di valore. Chiaramente, ogni blocco all'interno di ciascun canvas rappresenta una potenziale fonte di innovazione (Joyce & Paquin, 2016). Attraverso questa logica multi-strato, il framework contribuisce al dibattito in corso sul legame inestricabile di reciprocità tra sostenibilità e innovazione dei modelli di business esistenti (Medeiros, 2017).

Il livello economico del Business Model Canvas (BMC) originale descrive il modello di business di un'organizzazione tramite nove sezioni interconnesse, che includono la proposta di valore, le risorse chiave, le attività chiave, i partner, i segmenti di mercato, le relazioni con i clienti, i canali di distribuzione, la struttura dei costi e i flussi di ricavi (Osterwalder et al., 2005; Verrue, 2014). Questo livello è focalizzato principalmente su una logica tradizionale di profitto, mettendo in evidenza la dimensione economica nel contesto della sostenibilità (Budimanet al., 2023). Al contrario, il livello ambientale del Triple Layer Business Model Canvas (TLBMC) si fonda sull'approccio della Life Cycle Assessment (LCA), che analizza le implicazioni ambientali di un prodotto o servizio durante tutte le fasi del suo ciclo di vita (Finnveden et al., 2009). In questo contesto, il livello ambientale mira a dimostrare la capacità di un'organizzazione di generare benefici ecologici che bilanciano le esternalità negative create, fornendo agli stakeholder una comprensione più chiara degli impatti ambientali delle attività aziendali. Questo livello aiuta le aziende a indirizzare i propri sforzi per raggiungere una sostenibilità ambientale effettiva, integrando il ciclo di vita nel modello di business e permettendo una misurazione più solida e quantitativa degli impatti (Joyce & Paquin, 2016). Al centro di questo canvas si trova il valore funzionale, che si interconnette con altri elementi, tra cui forniture, outsourcing, materiali, produzione, fine vita, distribuzione e uso del prodotto (Putra, 2020).

Il livello sociale, infine, si ispira alla teoria degli stakeholder, che sostiene che le decisioni aziendali dovrebbero mirare a creare valore per tutti i gruppi o individui che possono influire o essere influenzati dal raggiungimento degli obiettivi organizzativi (Freeman, 1984). Questo livello, che rappresenta la "S" del paradigma ESG, include vari attori, tra cui le comunità locali, la governance, i dipendenti, la cultura sociale, gli utenti finali e, in generale, il valore sociale generato dall'organizzazione (Sciarelli & Sciarelli, 2018). La capacità di un'impresa di generare benessere per gli stakeholder e per la società in generale è espressa attraverso gli impatti sociali, che considerano non solo i costi economici ma anche i sacrifici sociali legati alle attività aziendali, mentre i benefici sociali derivano dai risultati positivi generati dalle operazioni aziendali. La misurazione degli impatti sociali si effettua tramite indicatori legati alle ore lavorative, salute, sicurezza, coinvolgimento comunitario e altri aspetti rilevanti.

Nell'era dell'industria 4.0, anche il processo di digitalizzazione impatta sul processo di creazione del valore poichè favorisce l'accessibilità e la disponibilità dei dati, informazioni e conoscenze (Zimmermann, 2000). Più precisamente, la DT stimola le aziende alla riprogettazione dinamica delle attività del business model canvas mediante tecnologie digitali

per soluzioni digitalizzate e per il coinvolgimento del cliente. Nel primo caso, le aziende mirano ad adottare soluzioni digitali che rendono più efficaci ed efficienti lo svolgimento dei processi. Nel secondo caso, le aziende adottano strumenti digitali per incrementare le modalità di comunicazione, anche omnicanale (Matricano & Liguori, 2024)

Pertanto, il TLBMC non solo visualizza tutte le potenziali fonti di innovazione, ma collega componenti esplicite e implicite, fungendo anche da strumento di creazione. Un modello rappresentato in modo visuale, con vari strati, facilita lo sviluppo creativo di nuovi modelli di business. Infine, il TLBMC agisce come uno strumento di validazione, cercando di bilanciare i sacrifici e i benefici derivanti dal modello aziendale, offrendo una visione integrata delle dinamiche economiche, ambientali e sociali (Joyce & Paquin, 2016).

Purpose of the paper. *Il presente contributo intende proporre una ridefinizione olistica del Business Model Canvas che integri le dimensioni economiche, sociali, ambientali e di governance della sostenibilità, enfatizzando anche il ruolo rilevante, e spesso complicato, delle tecnologie digitali. Più precisamente, l'obiettivo principale è fornire un framework teorico unificato per esplorare come le innovazioni nei modelli di business possano migliorare le prestazioni ESG d'impresa.*

Come ampiamente mostrato nella sezione precedente, l'innovazione sostenibile dei modelli di business, infatti, rappresenta un campo di riflessione accademica crescente (Evans et al., 2017). La letteratura precedente ha focalizzato l'attenzione solo sulla creazione di valore economico, definendo la tela originale del Business Model Canvas (Ostelwalder e Pigneur, 2010). Successivamente, alcuni studi hanno riprogettato il modello tradizionale, inserendo il livello sociale e ambientale per giungere al TLBMC (Joyce et al., 2016). Altri studi adottano invece un approccio più settoriale, sviluppando un modello basato sul canvas originale di Ostelwalder e Pigneur (2010), orientato all'esplorazione della bioeconomia circolare nel settore della moda (Basile et al., 2025). Nel flusso di ricerca identificato, Marnoto et al. (2024) indagano la relazione tra il paradigma ESG e le capacità digitali, analizzando come queste possano favorire l'innovazione del modello di business, con un focus specifico sulle aziende familiari. Tuttavia, nonostante la crescente attenzione alla sostenibilità ESG, esistono ancora pochi studi che indagano la dimensione di governance soprattutto nel settore bancario (Hope e Thomas, 2008; Hristov & Searcy,2024). Come evidenziato da Dicuonzo et al. (2022), l'integrazione della sostenibilità nei sistemi di governance delle banche è fondamentale per rispondere alla crescente domanda di trasparenza e responsabilità da parte degli stakeholder. In questo contesto, la governance gioca un ruolo cruciale nelle istituzioni finanziarie sulla dimensione sociale e ambientale. Tale approccio non solo rafforza la reputazione delle banche (Houston e Shan, 2019), ma contribuisce anche alla stabilità finanziaria (Chiaramonte et al., 2021).

Anche se una parte di studiosi (Evans et al., 2017) sta iniziando a costruire una prospettiva integrata per comprendere come le innovazioni nei modelli di business possano contribuire alla creazione del valore ESG aziendale, nessun contributo ha esteso la coerenza orizzontale (la profondità di ciascuno strato) e verticale (la sinergia tra i diversi livelli) del TPLBC, aggiungendo la tela della governance di sostenibilità ESG.

Inoltre, sebbene Matriciano e Liguori (2024) abbiano proposto un modello digitale basato sulla versione economica del BMC di Osterwalder e Pigneur (2010), non esistono studi che esplorano in modo approfondito il ruolo delle tecnologie digitali nell'ambito di un Business Model Canvas esteso alla sostenibilità olistica ESG. Con l'obiettivo di colmare questi gap, il presente contributo intende rispondere alle seguenti domande di ricerca:

RQ1: Come il fattore di governance (G) può essere integrato nel Triple Layered Business Model Canvas ?

RQ2: Come l'approccio digitale può essere incluso nel business model canvas allargato al paradigma ESG?

Methodology. *Per testare la componente Governance (G) e il BMC digitale all'interno del nuovo framework sviluppato, i dati saranno raccolti seguendo la metodologia di Yin (2003), che prevede diversi passaggi: 1) definire le domande di ricerca e gli obiettivi, 2) sviluppare un protocollo di studio di caso che dettagli il suo scopo, le procedure di raccolta dati, la struttura del report dello studio di caso e le domande del protocollo (incluso il modo in cui operazionalizzare il fenomeno e formulare le domande dell'intervista).*

Il nostro studio si focalizzerà sul settore bancario, in cui la dimensione della Governance (G) riveste un ruolo di primaria importanza. Verrà adottato un approccio di studio di caso singolo, in quanto particolarmente adatto a descrivere fenomeni complessi in modo dettagliato e approfondito, come evidenziato da Siggelkow (2007). Se applicato correttamente, questo metodo si rivelerà particolarmente utile per la ricerca scientifica, la valutazione di programmi e lo sviluppo di teorie e interventi (Baxter & Jack, 2008). Questo approccio consentirà un'analisi olistica e approfondita dei fenomeni studiati (Patton, 1980; Mackey & Gass, 2015) e permetterà di esaminare le diverse sfaccettature di un fenomeno complesso (George et al., 2005). Inoltre, risulterà efficace per rispondere a domande di tipo "come" e "perché" (Gerring, 2006). Come sottolineato da George (2005), questa metodologia si dimostrerà particolarmente efficace per l'analisi di fenomeni rilevanti in contesti rari o unici.

Sebbene i risultati di uno studio di caso singolo non siano statisticamente generalizzabili, essi offriranno una comprensione ricca e contestualizzata di situazioni specifiche, contribuendo all'approfondimento teorico e pratico (Corden & Sainsbury, 2006). Seguendo studi precedenti (Yin, 2003; Gnyawali & Park, 2011), la raccolta dati si svolgerà in due fasi, coerentemente con tale approccio.I dati secondari verranno raccolti tramite siti web, bilanci di sostenibilità e documenti ufficiali dell'ente bancario. Successivamente, i dati saranno acquisiti attraverso interviste semi-strutturate condotte da un team di ricerca. La collaborazione tra più ricercatori arricchirà l'analisi, migliorando la qualità dei dati grazie alla diversità di prospettive e rafforzando la credibilità dei risultati attraverso osservazioni convergenti (Eisenhardt, 1989).

Expected Results. *Attraverso l'analisi di un caso di studio singolo nel settore bancario, condotta mediante interviste e un'approfondita revisione documentale, verranno sviluppate due matrici che non solo integreranno la dimensione della governance, ma includeranno progressivamente anche le tre dimensioni della sostenibilità (ESG) e la dimensione digitale.*

La prima matrice verrà elaborata per mappare e strutturare le interconnessioni tra diversi aspetti della governance aziendale, identificando aree chiave come Inclusione e Diversità, Pianificazione Strategica, Etica e Responsabilità Sociale, Creazione di Valore nella Governance, Cultura Aziendale, Coinvolgimento degli Stakeholder, Trasparenza, Impatto della Governance e Benefici della Governance.

Successivamente, la seconda matrice sarà sviluppata con un approccio più ampio e integrato, incorporando le dimensioni ambientale, sociale e di governance (ESG) insieme alla dimensione digitale. In questo modello ampliato, alle sezioni precedenti si aggiungeranno: ESG Value, ESG Impacts e ESG Benefits.

Questo approccio permetterà di potenziare la coerenza strategica su due livelli: orizzontale, garantendo un allineamento sinergico tra le diverse funzioni aziendali, e verticale, assicurando l'integrazione delle strategie di sostenibilità in tutti i livelli organizzativi. Il modello proposto non solo contribuirà a una visione più sistemica e integrata della sostenibilità aziendale, ma offrirà anche un supporto concreto per la definizione di pratiche manageriali più efficaci e responsabili.

Research limitations. *Questa ricerca presenta alcune limitazioni, principalmente riconducibili alla scelta metodologica adottata. Sebbene l'analisi di caso permetta un'esplorazione approfondita e dettagliata del fenomeno studiato, i risultati ottenuti non sono automaticamente generalizzabili ad altri contesti. Tale limite è ulteriormente accentuato dal focus esclusivo sul settore bancario, che potrebbe non riflettere le dinamiche presenti in altri ambiti.*

Per rafforzare la validità esterna e la trasferibilità delle evidenze emerse, sarebbe opportuno estendere l'indagine a una più ampia gamma di settori, adottando un approccio comparativo che consenta di individuare sia caratteristiche comuni sia specificità settoriali. A tal fine, le ricerche future dovrebbero esplorare contesti differenti, validando, affinando e adattando i risultati osservati nel settore bancario. Inoltre, l'integrazione di metodi quantitativi potrebbe supportare la verifica empirica delle intuizioni emerse, ampliando così le prospettive di indagine e fornendo una base più solida per le implicazioni teoriche e pratiche dello studio.

Un'ulteriore limitazione riguarda la dimensione digitale analizzata nel modello proposto. Sebbene il nostro studio consideri il processo di digitalizzazione, non viene esaminato in modo specifico il ruolo degli strumenti di intelligenza artificiale. Poiché l'adozione di tecnologie avanzate, come il machine learning e l'automazione basata sull'intelligenza artificiale, sta trasformando significativamente le strategie e le operazioni nel settore bancario e oltre, futuri studi potrebbero approfondire questa prospettiva, valutandone l'impatto sulle dinamiche organizzative e sulle capacità gestionali.

Managerial implications. *Da una prospettiva manageriale, questa ricerca contribuisce a una comprensione più approfondita di come imprenditori, manager, professionisti, esperti e accademici possano utilizzare il modello concettuale proposto per fornire una visione olistica della creazione di valore ESG (Marnoto et al., 2024) nel settore bancario. In particolare, i manager possono orientare le proprie strategie di innovazione integrando il paradigma ESG nel processo di digitalizzazione. Lo studio suggerisce, infatti, uno strumento che supporti l'inserimento della sostenibilità nell'innovazione dei modelli di business.*

Originality of the paper. *Questo studio contribuisce all'ampliamento della comprensione teorica sulle dinamiche di interazione tra le pratiche ESG e le capacità digitali nel promuovere l'IMC, con un focus specifico nel settore bancario. Attraverso una scomposizione analitica delle pratiche ESG nelle dimensioni ambientale, sociale e di governance, la ricerca fornisce un quadro dettagliato delle sinergie e delle potenziali tensioni che emergono nell'integrazione con le capacità digitali.*

Key words*: business model, sustainable innovation, digital canvas, ESG performance; sustainability, tertiarization*

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Track
General management

From farmers to the service marketplace: a choice experiment[1]

CLEMENTINA BRUNO[2] ANTONELLA CAPRIELLO[3]

Abstract

This research contribution explores the results of a choice experiment developed within the market analysis activity contextualized in the project Pa.N.E. - Panem Nostrum Everyday - Nutrire Terdona, funded by the European Union and the Piedmont Region, and focused on the development and the promotion of an ancient wheat variety, Wheat San Pastore, by relying on a relatively new bread, Pane Grosso di Tortona, and related bakery products. The choice experiment, proposed with a paper-based questionnaire and after tasting the product, is aimed at evaluating the potential consumers' willingness to purchase Pane Grosso, depending on the price level, the bread format and the distribution channel. In addition, socio-demographic and lifestyle variables are considered, as well as the characteristics consumers evaluate in making their bread purchase. The data collected through the questionnaire have been analyzed with a logit model. The results provide relevant insights related to the most promising distribution channels, the role of price, the preferred bread format, and suggest some interesting consumers segments to be targeted.

Framing of the research. *This research contribution has been developed in the framework of a multi-disciplinary project, project Pa.N.E. - Panem Nostrum Everyday - Nutrire Terdona, funded by the European Union and the Piedmont Region, aimed at recovering and relaunching an ancient wheat variety, Wheat San Pastore, whose production was designed to be used for bread, resulting in the ad-hoc creation of bread (Pane Grosso di Tortona), and for related bakery creations, with sweet and savory products.*

The physical chemical, analytical chemical and biomedical analysis conducted by our project partners showed that Pane Grosso, obtained by Wheat San Pastore, presents particular nutritional characteristics that could allow to classify it within the category of functional foods in accordance with the dominant literature. In addition, the cereal is cultivated using environmentally friendly techniques and the approach is consistent with sustainable principles.

According to the literature bread, indeed, is recognized by consumers as a good base product for carrying functional properties (Kraus, 2015). The same author also highlights that good taste, as well as being a safe, natural and healthy products, are among the most important attributes of functional foods. Sgroi et al. (2024) highlight the role of frequency of consumption and of product knowledge in determining functional food demand; in addition, the authors highlight the relevance of socio-demographic factors, such as age, income, gender and urban population density (their study is focused on the Sicily region). Indeed, in functional foods, market segmentation appears as particularly relevant, since the different segments show different motivations and different purchasing behaviors (Horská et al., 2023; Kapoor and Munjal, 2017; Annunziata and Vecchio, 2010).

Tikkanen e Vääriskoski (2010) showed that consumers perceive, among the others, the functional benefits of branded bread. With respect to the "naturality" attributes, Edenbrant et al. (2018), focusing on rye bread, demonstrated that consumers prefer pesticides-free products and methods and organic bread. De Boni et al. (2019), in their experiment comparing three different high-quality Italian breads with special focus on sustainability issues, underline that the main factor explaining consumers' choices are price sensitivity, food waste management sensitivity, nutritional characteristics, attitude towards consuming special breads, consumers' knowledge of sustainability. Among these factors, the healthy characteristics of the product represent information difficult to achieve, suggesting the relevance of communication activities.

Therefore, in a national market where bread consumption is particularly low with respect to the European level (41 kg per capita per year in Italy; the corresponding value for Romania is 74 kg; Italmopa, 2024), the Wheat San Pastore bread shows feature that can result as appealing for modern consumers. In addition, Italian consumers preferences remain firmly tied to bakery purchases, with 20 thousand artisanal bakeries active all over the Country, producing 1,5 million tons of bread (Il Sole 24 Ore, 19th January 2024). It appears worthwhile, however, to explore the opportunities for other distribution channels: especially after the pandemics, grocery purchases have demonstrated a tendency towards

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[1] This paper has never been presented in academic conferences and is not published or submitted for publication to any journal. However, we highlight that preliminary versions of these contents appear in the project reports and have been presented during the project dissemination events, as well as in a seminar in our University, open to students, colleagues and the public.

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multichannel shopping, both for young and adult consumers, and the need to meet timesaving and convenience requirements, but also the rediscovery of human relationship (Bellini et al., 2023).

Purpose of the paper. *This paper presents the results of a quantitative study aimed at verifying the market opportunities for Wheat San Pastore products, with a special focus on Pane Grosso. The study, carried out from a B2C perspective, complements a B2B qualitative analysis focused on bakeries, restaurants and pastry shops and an analysis based on expert opinions. Moreover, the findings appear relatively robust with a parallel B2C analysis based on qualitative methods (focus group), not reported in this paper, reveling the consistency of our findings.*

The aim of the quantitative study is to verify the (potential) consumers' attitude towards Pane Grosso after tasting the product. In particular, we tested the stated consumers' propensity to buy Pane Grosso in different scenarios, accounting for the role of price, of the bread format and of the distribution channel, potentially relevant variables in determining consumers' choice, following the elements emerging from the literature discussed above. The analysis also considers socio-demographic characteristics of respondents, as well as their consumption habits and their lifestyle, with the purpose of identifying the most promising target segments for Wheat San Pastore products.

Methodology. *For the primary data collection, we relied on a paper-based questionnaire, containing a choice experiment, administered at the same time as Pane Grosso tasting.*

In the questionnaire, respondents were asked to answer questions related to the following themes:

- *Demographic variables: gender, age, place of residence, interest in sport activities, household composition, education.*
- *Bread consumption habits: bread consumption and quantity, usual point of sale, usual type of bread purchased, most relevant attributes driving the bread choice, willingness to pay for ancient wheat bread, consumption of other bakery products.*
- *Knowledge of Pane Grosso and tasting, evaluation of the tasting experience and availability to recommend the product.*
- *Choice experiment: to each respondent, we presented 4 choice scenarios, in which he was required to state whether he would have been willing to purchase Pane Grosso with the proposed characteristics (related to the product and the distribution channel), or if he would have preferred his usual bread type, purchased at his customary point of sale. The 4 scenarios referred to 4 different distribution channels (artisanal bakery, supermarket, Coldiretti local market, online purchase with home delivery); The scenario also presented varying price levels (consistent with the proposed distribution channel) and two different bread format (0.5 kg and 1 kg).*

We run a descriptive statistical analysis of the collected data, which has provided interesting information related to the consumers consumption habits, the knowledge of the product, and the level of satisfaction with the product after tasting. In addition, the choice experiment allowed the application of an econometric analysis oriented towards the identification of the variables relevant for explaining the preference for Pane Grosso, in terms of product attributes and consumer characteristics. This information is relevant both in terms of market strategy and to formulate service marketing policies.

The choice experiment generated, in each scenario, a binary response variable (stated willingness or non-willingness to purchase Pane Grosso with the described attributes). We analyzed this data by applying a model able to deal with binary discrete response variables, namely the logit model. If we define as Y=1 the willingness to buy Pane Grosso and Y=0 the alternative (preference for the usual bread type at the customary sale point), the logistic regression modelling the probability of preferring Pane Grosso can be defined as (see Franses and Paap, 2001, whose notation is maintaned):

$$\Pr[Y_i = 1|X_i] = F(X_i\beta) = \frac{exp(X_i\beta)}{1 + exp(X_i\beta)}$$

For all the i observations in the sample, Y_i represent the response variable, assuming value 1 or 0; X_i represent the explanatory variables (product or respondent characteristics), and β are the variable coefficients. Notice that, since each respondent has been asked to evaluate four purchase scenarios, we have four observations for each respondent, which cannot be considered as independent. Therefore, we run the estimates using cluster robust standard errors.

Results. *The questionnaire has been distributed during several local events taking place from spring to autumn 2023. In addition, a limited number of questionnaires have been administered to subjects interested in tasting the product and participating to the survey. The total number of questionnaires collected is 258. Not all the questionnaires resulted to be filled in all their parts. Therefore, for each point analyzed below, we will indicate the related number of observations.*

Among the respondent, women prevailed (146 women vs 111 men; one missing data). 21% of respondents are in the age range 18-30 years old. A similar percentage refers to the range 31-45, while about 32% is in the class 46-60 and 19% in the class 61-75. The over-75s are relatively underrepresented, with less than 7% of the questionnaires.

The majority of respondents (57% of 257 respondents) practices sport at an amateur level. In addition, most respondents (59% of 258) live in the province where the production of Pane Grosso is mainly concentrated, which is not surprising given the local nature of the events during which the questionnaires where collected.

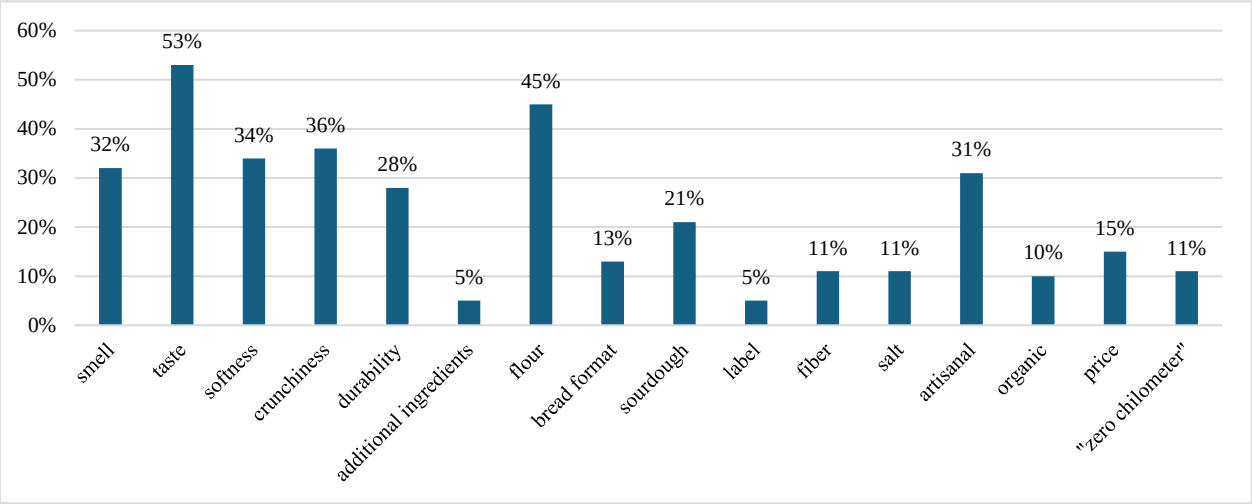
With respect to the education level, we found that the majority of interviewees own a high school (46%) or a university (31%) degree; the basis is 257 observations. Finally, the average dimension of the household is about 2.5 components,

with a certain variability (from a minimum of one to a maximum of seven components, the statistics are based on 251 observations).

Considering bread consumption habits, we found that more than 12% of the sample (257 interviewees) does not habitually consume bread. With respect to the quantity consumed in the household, 37% of the respondents consume less than 500 gr. per week, 38% between 500 gr. and one kg. 20% between 1 and 2 kg. and less than 5% more than 2 kg. (basis: 237 answers). As expected, the weekly consumption tends to increase with the dimension of the households, although the trend is not strictly increasing. The preferred point of sale is the bakery (69%), followed by the supermarket (37%). Only a minority of respondents commonly purchase bread at the Coldiretti farm market (3%) or relies on different channels (7%). Notice that the percentages do not sum up to 100% since several respondents indicate more than one option; a total of 230 respondents provided this information. About the preferred type of bread, we found an impressing variety of responses. Interestingly, some respondents mentioned Pane Grosso.

An interesting question concerned the most relevant characteristics the respondents considered in purchasing bread. Notice that we required to indicate a maximum of three options within the options set we provided, but several respondents have chosen more than three options, and we decided to keep all the answers. Figure 1 represents the frequency of choice of each characteristic (basis 255 answers).

Figure 1. Relevant characteristics in bread purchase



Source: our elaboration

The most relevant characteristic, as expected, is bread taste (53%), although the texture would prevail if we considered softness and crunchiness together (34% and 36% respectively). Attention is payed also to the type of flour, the smell and the artisanal nature of the product. Notice that price is considered as relevant by only 15% of the respondents. However, in the following question, related to their willingness to pay for an ancient wheat bread, the most frequently chosen range is between 3 and 4 euros per kg (238 respondents), which is a relatively low price. Therefore, the role of the price variable needs to be explored more deeply.

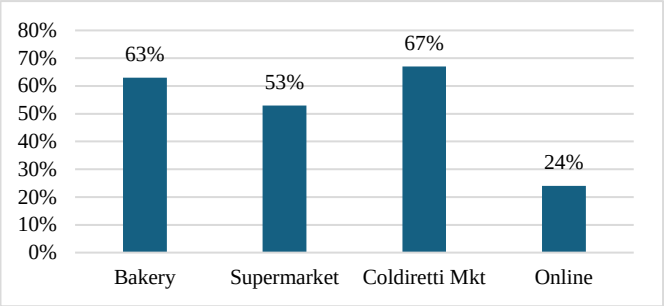
The majority of interviewees (85%) state that they use other bakery products (basis: 254 respondents) and the most mentioned are "grissini" (52%), "focaccia" (59%) and pizza (54%) (basis 223 respondents).

With specific regard to Pane Grosso, we found that only 39% of respondents (basis: 257) stated that they already knew it. Considering that most of them live relatively close to the production area, this indicates that Pane Grosso can be still considered as a relatively "new" product, for which marketing and communication actions are recommended. 254 respondents accepted to taste Pane Grosso. The appreciation for the product has been high, with an average score of 8.3 on a scale ranging from 1 to 10. Notice that we remark some case of non-appreciation, as well as of extremely high appreciation, with the score ranging from a minimum value of 4 to a maximum value of 10 (basis: 248 respondents). In addition, 98% of respondents (basis: 256 respondents) would recommend the product.

With respect to the choice experiment, we found an acceptance rate of Pane Grosso equal to about 52%, meaning that slightly more than one half of the proposed scenarios have been accepted by the respondents.

Figure 2 represents the acceptance rate per distribution channel, showing that scenarios with highest acceptance are those considering Coldiretti farm market and artisanal bakeries.

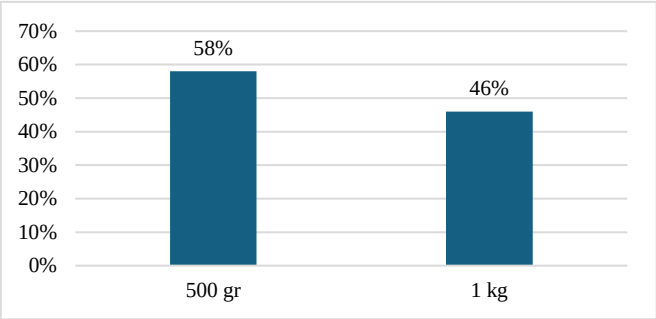
Figure 2. Pane Grosso acceptance rate in the choice experiment by distribution channel



Source: our elaboration

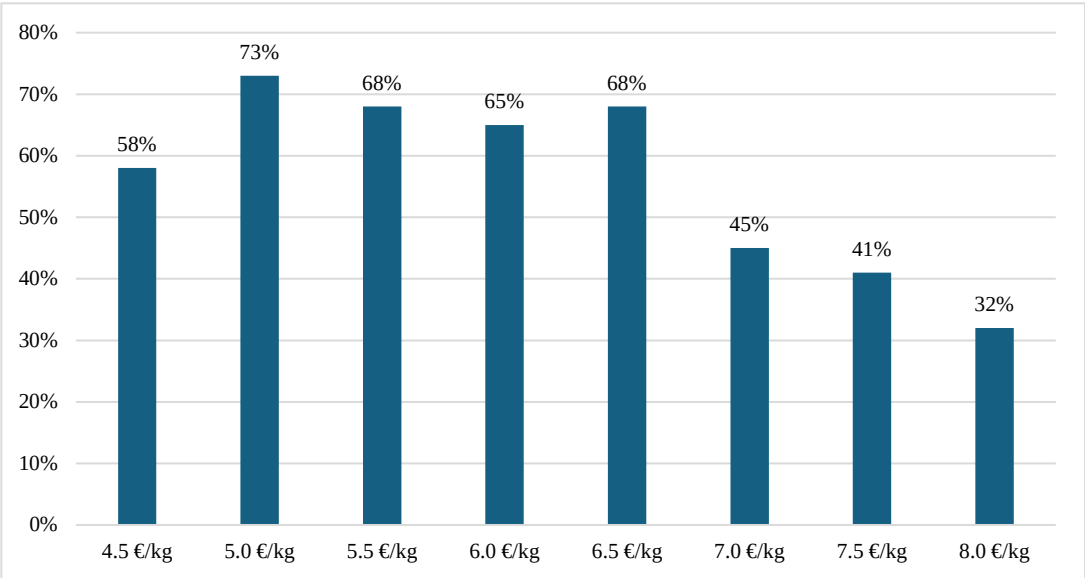
Figures 3 and 4 represent the acceptance rate by bread format and by price level. With respect to the former attribute, we found an average acceptance rate higher for the smaller format, which is consistent with the current tendency of low bread consumption that characterize Italian households. With respect to the price attribute, we find, as expected, a negative relationship with the acceptance rate. However, this trend is not completely evident, especially regarding the lower price range. In particular, the acceptance rate appears relatively low for the lower price level, thus suggesting that higher demand could not strictly correspond to lower prices, in the case of bread type with special characteristics. This evidence supports the need to deepen the analysis of the role of price (notice that not all the price levels have been proposed for each distribution channel, since we have decided to exclude prices implausibly low or high for specific channels).

Figure 3. Pane Grosso acceptance rate in the choice experiment by bread format



Source: our elaboration

Figure 4. Pane Grosso acceptance rate in the choice experiment by price level



Source: our elaboration

We have analyzed the preferences stated by potential consumers in the proposed choice experiment with a logistic regression, aimed at explaining the stated choice of purchasing or not Pane Grosso with the attributes described in each scenario. In addition, we have considered additional explanatory variables, related to demographic characteristics of the respondents and their consumption habits and lifestyle. Table 1 reports descriptive statistics for the independent variables considered. Notice that, in principle, for each respondent we should have 4 observations, since the choice experiment presented 4 scenarios per questionnaire. However, not all the interviewees have provided an answer for all the proposed scenarios, therefore Table 1 reports the summary statistics for the completed scenarios only, corresponding to 939 observations. For the other explanatory variables, additional missing values emerge.

The first five variables reported are attributes characterizing the scenarios considered. In particular:

- *half_kg is a dummy variable equal to one if Pane Grosso is proposed, in the scenario, in the 500-gr. format, and zero in the alternative case (1 kg format);*
- *Coldiretti_mkt, online and bakery are binary variables that assume a value equal to one if that distribution channel has been proposed in the scenario, and zero otherwise. The supermarket channel has, as well, been proposed to respondents and it is considered the base case, with the related dummy variable omitted to avoid multicollinearity:*
- *p is the variable that captures the price at which Pane Grosso has been proposed in each scenario. The proposed values range from 4.5 to 8 €/kg.*

Subsequently we consider some socio-demographic or lifestyle variables characterizing the respondents:

- *sport is a dummy variable equal to one if the respondent states that she/he practices sport (at an amateur or at a competitive level);*
- *graduate or more is a dummy variable equal to one for people owning a university degree or a higher title;*
- *high_cons is a dummy variable equal to one for respondents stating that, in their household, the weekly bread consumption is more than one kg;*
- *age_18_30, age_31_45, age_46_60 are dummy variables assuming value of one when the respondent belongs to the related age class, and zero otherwise. The last two age categories (including people from 60 to 75 years old and people over 75) have been aggregated, due to the low numerosity of the latter class, and serve as base case, with the related variable omitted in order to avoid multicollinearity;*

Finally, the variables identified by the prefix "c_" are dummies assuming value equal to one when the respondent has identified the related characteristic as relevant for bread purchase and correspond to the characteristics described in Figure 1.

Table 1. Summary statistics of the variables considered in the logistic regression

Variable	Obs	Mean	Sd. Dev.	Min	Max
half_kg	939	0.507	0.5	0	1
coldiretti_mkt	939	0.253	0.435	0	1
Online	939	0.239	0.426	0	1
Bakery	939	0.257	0.437	0	1
P	939	6.579	1.098	4.5	8
Sport	935	0.581	0.494	0	1
graduate_or_more	939	0.446	0.497	0	1
high_cons	876	0.256	0.437	0	1
age_18_30	936	0.224	0.417	0	1
age_31_45	935	0.218	0.413	0	1
age_46_60	935	0.303	0.46	0	1
c_smell	931	0.316	0.465	0	1
c_taste	931	0.524	0.5	0	1
c_softness	931	0.356	0.479	0	1
c_crunchiness	931	0.369	0.482	0	1
c_durability	931	0.286	0.452	0	1
c_addit_ingredients	931	0.053	0.223	0	1
c_flour	931	0.461	0.499	0	1
c_bread_format	931	0.133	0.34	0	1
c_sourdough	931	0.208	0.406	0	1
c_label	931	0.055	0.228	0	1
c_fiber	931	0.106	0.308	0	1
c_salt	931	0.112	0.315	0	1
c_artisanal	931	0.301	0.459	0	1
c_organic	931	0.107	0.31	0	1
c_price	931	0.162	0.369	0	1
c_zero_km	931	0.112	0.315	0	1

Source: our elaboration

Table 2 presents the results of the estimates related to three logistic regression models. In order to obtain estimates as parsimonious as possible, we implemented a (forward) stepwise procedure, in order to preserve only the significant coefficients. The significance threshold has been fixed at a p-value of 0.1. In Table 2, the column referred to Model (1)

shows the coefficients of the explanatory variables that remained after applying the stepwise procedure (from the full set of variables presented in Table 1).

With respect to the distribution channel considered, we find that that the online channel significantly reduces the probability of accepting (stating that one would have purchased) Pane Grosso, with respect to the base case represented by the supermarket channel, as shown by negative and significant coefficient of the variable "online". On the other hand, the availability of the product at an artisanal bakery would significantly increase the acceptance probability. The "Coldiretti_mkt" variable disappears after the application of the stepwise procedure, meaning that the preference towards this channel does not significantly differs from the preference given to the supermarket. Therefore, we can conclude that, among the distribution channels considered, the preferred one is the bakery, while the least valued one is the internet. Coldiretti market and supermarket lie at intermediate levels.

The "small" format for bread (500 gr. rather than 1 kg) increases the probability of acceptance, and this is relatively consistent with the tendency shown by the Italian household to consume limited quantities of bread. Although Pane Grosso tends to show high durability, probably the respondents prefer to consume more fresh bread in a smaller format.

The price variable, although not considered as relevant by many respondents in making their bread purchase (Figure 1), appears to be significant in explaining the preferences stated in the choice experiment. Indeed, the price coefficient is negative (as expected) and highly significant, meaning that price has a role in making an evaluation of a potential purchase.

With respect to the respondent characteristics, we find that the dummy "high_cons" present a negative and significant coefficient. This means that Pane Grosso is less appealing for consumers living in households with relevant bread consumption. This result could be related to budget constraints, or lower willingness to pay for niche or "premium" products (such as Pane Grosso), in families characterized by high consumption.

The three age dummies present positive and significant coefficients, meaning that the respondents belonging to the three considered age classes are more willing to buy Pane Grosso, all things equal, than respondent aged more than 60. This is particularly evident for the youngest consumers class, which shows a coefficient larger in magnitude and with higher significance level, suggesting that this could represent a particularly interesting segment.

With respect to characteristics considered by respondents in their actual bread purchases, the preference for local products ("c_zero_km"), for the use of sourdough and for organic foods increase the acceptance probability, meaning that Pane Grosso meets the tastes of consumers that evaluate these characteristics. The attention paid to price, instead, reduces the probability of choosing Pane Grosso in the choice experiment, as expected, since high price sensitivity is likely to reduce the willingness to purchase niche products.

Subsequently, we decided to deepen the analysis of the price attribute. Indeed, on one hand, we found that the price characteristic is considered as relevant for bread purchases by a relatively small share of respondents. In addition, the relationship between proposed price and acceptance rate in the choice experiment is not completely clear (Figure 4). On the other hand, however, the estimates of Model (1) show a negative and significant effect of price on the acceptance probability (when all the other variables are held constant). Therefore, we have tested the estimates of Model (2) and Model (3). In Model (2), we apply the mentioned stepwise procedure to a set of explanatory variables including, in addition to the variables tested in Model (1), also the squared price (p2), in order to allow a potential non-monotonic price effect. Moreover, in Model (3) we add also the interactions between the price variable and the socio-demographic and lifestyle variables resulted as significant in Model (1), namely the age dummies and "high_cons" variable, in order to verify if the price effect is different for several consumers segments.

In both the Models (2) and (3), the stepwise procedure preserves the variable "p2" but eliminates the variable "p". Therefore, from Model (2) we conclude that the inclusion of the square price term is useful, since it allows a curvilinear price effect, which remains, however, strictly decreasing for all positive price levels. Slightly different are the results of Model (3), where the application of the stepwise procedure preserves two interaction terms (in both the cases, the variable not interacted with price disappears). One term is the interaction between "p" and "high_cons", which shows a negative and significant coefficient, suggesting that respondents living in households characterized by high bread consumption levels tend to be more sensitive to price, which seems a reasonable conclusion. The other term involves the interaction between price and the most represented age class (namely people between 46 and 60 years old). In this case, the positive and significant coefficient indicates that, for this age class, the sensitivity to price is lower than for the other categories. In addition, for this age class only, the effect of price is non-monotonic in the range of positive price level, although we verified that it is strictly decreasing for the price levels proposed in the choice experiment. For all the other significant variables considered, Model (2) and (3) do not present relevant differences with respect to Model (1).

Table 2. Results of the logistic regression estimation

VARIABLES	Model (1)	Model (2)	Model (3)
Online	-1.061***	-1.033***	-1.048***
	(0.206)	(0.209)	(0.211)
Bakery	0.409**	0.404**	0.410**
	(0.171)	(0.170)	(0.171)
half_kg	0.515***	0.516***	0.523***
	(0.143)	(0.144)	(0.144)
P	-0.388***		
	(0.0872)		
p2		-0.0314***	-0.0317***
		(0.00681)	(0.00691)
high_cons	-0.598**	-0.594**	
	(0.235)	(0.235)	
age_18_30	1.049***	1.048***	1.085***
	(0.312)	(0.312)	(0.315)
age_31_45	0.528*	0.530*	0.556*
	(0.294)	(0.294)	(0.294)
age _46_60	0.613**	0.613**	
	(0.257)	(0.257)	
p_high_cons			-0.0935***
			(0.0358)
p_age_46_60			0.0989***
			(0.0381)
c_zero_km	0.647**	0.659**	0.657**
	(0.319)	(0.321)	(0.320)
c_price	-0.695***	-0.697***	-0.701***
	(0.259)	(0.259)	(0.260)
c_sourdough	0.600**	0.601**	0.607**
	(0.263)	(0.264)	(0.265)
c_organic	0.624*	0.626**	0.613*
	(0.319)	(0.319)	(0.317)
Constant	1.959***	0.795**	0.784**
	(0.574)	(0.350)	(0.331)
Observations	868	868	868

Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

Source: our elaboration.

Research limitations. *A limitation of the study is represented by the sample composition. In fact, although the data have been mainly collected in the area corresponding to the reference market of Pane Grosso, the respondents' participation was completely on voluntary basis, and we have accepted all the voluntary respondents. Therefore, the sample may not completely represent the characteristics of the population of the area and this point limits the possibility of generalizing the results. Nevertheless, we believe that the study provides relevant insights regarding the potential market for Pane Grosso and reveals the key distribution channels.*

Managerial implications. *Notwithstanding the caution imposed by the limitations of the research discussed above, this study provides important insights for the development of proper market strategies for Pane Grosso. First, the high appreciation of Pane Grosso demonstrated by the respondents after tasting, and the large use of other bakery product different from bread, suggest a good market potential for Pane Grosso and the related bakery products. With special focus on Pane Grosso, we found indications about the most promising distribution channel (bakeries), and the least promising one (online sales), as well as about the bread format, with a smaller one preferred over the "standard" one-kg format. In addition, although most respondents do not indicate price as a relevant variable in making bread purchases (which is also a reasonable statement given the little relevance of bread expenditure with respect to the household budget), in the proposed choice experiment we found that price does matter in explaining respondent stated preferences. Therefore, the price variable cannot be neglected in Pane Grosso marketing mix definition. Finally, the most appealing target segments seem to be younger consumers, but also middle-aged consumers which resulted as less price sensitive, and consumers that value local and natural products. Price-sensitive consumers, instead, are not likely to appreciate this niche product.*

Originality of the paper. *The paper adopts a stated-preference approach for supporting the development of a marketing strategy for a relatively new product, Pane Grosso, characterized by a strong local connotation. The choice experiment on which the study is based has been conducted with reference to the local market (involving residents and potential visitors) and implied tasting the product. Therefore, the process simulated very closely the actual choices of potential consumers in the market.*

Key words: *bread; choice experiment, logistic regression, stated preferences.*

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Twin transition and spatial embeddedness: an empirical analysis on the Italian provinces

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Abstract

This paper investigates the factors influencing the adoption of digital, green, and twin transition (TT) practices across Italian provinces, considering the impact of public funding dispersion. Using the novel PLOTTI dataset, which integrates province level data from the ISTAT business census, the national database of state aids (RNA), and Moody's AIDA, we capture the diffusion of digital, green, and twin innovations at the local level. Our empirical analysis relies on a cross-sectional econometric framework that incorporates spatial dependencies to identify provincial spillovers. Preliminary results reveal that a more evenly distributed allocation of public funds, in other words, lower concentration, facilitates broader engagement with both digital and green innovations, suggesting that inclusive policy approaches accelerate TT adoption in local production systems (LPSs). We discuss implications for policymakers and business leaders, emphasizing the need for inclusive public interventions, collaborative networks, and place leadership arrangements that can help overcome the barriers to twin transition. While the paper highlights the importance of local production structures in Italy, we also outline that the lessons learned extend to any region seeking to reconcile sustainability goals with digital transformation.

Framing of the research. *The growing imperative of environmental sustainability and the rapid expansion of digital technologies have led scholars, policymakers, and businesses to explore new integrative frameworks, bringing together both green and digital innovations (Lichtenthaler, 2021; Lenz, 2021). Over the past decade, concerns regarding climate change, carbon emissions, and resource depletion have intensified (Markard et al., 2012). In response, governments worldwide have supported policies aimed at promoting a more sustainable economic system, from stricter environmental regulations to subsidies for renewable energy (Blüm, 2022).*

At the same time, recent technological breakthroughs, particularly in data analytics, artificial intelligence (AI), the Internet of Things (IoT), and robotics, have fundamentally reshaped the way businesses operate, communicate, and manage resources (Dwivedi et al., 2022). These digital transformations hold significant potential to reduce environmental footprints; for instance, advanced analytics can minimize waste by forecasting demand more accurately, while IoT solutions can enhance energy efficiency by monitoring machine performance in real time (Del Río Castro et al., 2021). Nonetheless, the environmental benefits of such digital tools are not automatic and can be offset by increased energy consumption, rebound effects, or the environmental costs of building digital infrastructure (Ahmadova et al., 2022).

Bringing these two imperatives together, the concept of the "Twin Transition" (TT) recognizes that combining sustainability with digitalization can yield synergies that accelerate innovation at multiple levels, ranging from individual firms to entire regional ecosystems (Bianchini et al., 2023). Twin Transition projects have the dual objective of greening the economy while leveraging digital solutions to address social and environmental issues in a cost-effective and innovative manner (Loorbach et al., 2017). This orientation strongly aligns with the European Union's strategic agenda, where the European Green Deal (2019) and NextGenerationEU (2021-2027) highlight the synergy between green and digital transitions (European Commission, 2023b).

Italy, known for its strong tradition of manufacturing and artisanal craftsmanship, provides an intriguing environment to study TT, particularly because of the country's distinctive economic structure. Various sized enterprises are often clustered in specialized local production systems (LPSs) and constitute a major share of the Italian industrial fabric

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(Bellandi et al., 2021). These LPSs can be found in well-known industrial districts, such as those focusing on textiles, furniture, or mechanical engineering, that have historically leveraged local social capital, cultural traditions, and specialized networks to sustain competitiveness (Becattini, 1987).

Despite their strengths in collaboration and product specialization, Italian companies also confront challenges: limited financial resources, relatively small scales of operation, and occasional reliance on path-dependent practices that may slow adoption of radical changes (Montresor & Vezzani, 2023). Consequently, the move to combine sustainability and digital solutions becomes a demanding task, given that these companies must simultaneously overcome the inertia of existing systems, adapt to new market pressures, and invest in skill development or infrastructure (Raven, 2007; Elzen et al., 2011).

Nonetheless, local production systems are often embedded in "place leadership" dynamics, wherein local institutions, trade associations, and regional agencies play a pivotal role in fostering innovation (Bellandi et al., 2021). Through coordinating funding, policy incentives, and training, these place leadership actors can accelerate the uptake of digital and green practices that might otherwise be too risky or resource-intensive for single companies to pursue alone (Macdonald & Williams, 1994).

Within the European Union, a combination of legislation (e.g., the Fit for 55 package) and recovery funds (e.g., the Recovery and Resilience Facility) aim to propel member states toward reduced emissions, energy efficiency, and widespread adoption of advanced technologies (European Commission, 2023a, 2023c, 2023d). Italy's National Recovery and Resilience Plan (PNRR) is similarly aligned, earmarking substantial investment to promote digital upgrades, reduce carbon emissions, and stimulate eco-friendly projects among both public and private sectors (Italian Ministry of Economy and Finance, 2021). Additional national programs, including Transition 4.0 tax credits and direct measures by agencies such as Invitalia or Banca del Mezzogiorno MedioCredito Centrale, contribute to a multi-pronged policy environment.

Despite these efforts, gaps remain in understanding precisely how these funds are distributed, whether they are concentrated among a few large beneficiaries or spread across multiple smaller businesses, and how this distribution shapes local economies' capacity to adapt and thrive within the TT paradigm. This phenomenon is of particular interest when examining spatial disparities in a country as regionally diverse as Italy, where industrial ecosystems, infrastructure, and public administration capabilities vary widely between the north, center, and south (Bianchini et al., 2023).

Purpose of the paper. *This paper seeks to explore the determinants of digital, green, and twin transition adoption at the provincial level in Italy, devoting special attention to the role of public funding dispersion. Our key research question is: What are the factors underlying the adoption of digital, green, and twin practices in Italian provinces?*

Understanding these dynamics has substantial policy relevance. While research on sustainability and digital innovation often targets individual firm outcomes, local production systems and provinces provide a broader lens to examine systemic changes, knowledge spillovers, and collective learning (Montresor & Vezzani, 2023). If TT is to become deeply rooted in local industrial fabrics, it is crucial to consider how funds, infrastructure, institutions, and place-based leadership interact in different regions.

Recent literature suggests that both environmental and digital innovations are shaped by local context, including institutional arrangements, the degree of networking among firms, and regional capacity for R&D (Lichtenthaler, 2021; Sareen & Haarstad, 2021). At the firm level, digital readiness and green orientation may be highly correlated, such that early adopters of advanced digital tools often find it easier to incorporate sustainability practices over time (Montresor & Vezzani, 2023). Nevertheless, smaller enterprises may lag behind if financial barriers, policy misalignments, or knowledge deficits prevent them from investing in both digital upgrades and sustainability transitions simultaneously.

A key contribution of this paper is examining how public funds, particularly state aids, are distributed within a province. Rather than look solely at the total volume of funds, we measure the degree to which that support is concentrated or dispersed using the Herfindahl-Hirschman Index (HHI). Previous research indicates that, while "big push" investments in a handful of champion firms may accelerate short-term outcomes, it often fails to generate more widespread local spillovers (Pfeffer, 1972). Conversely, distributing funding among a broader base of businesses can encourage more inclusive adoption processes, stimulate knowledge exchanges, and enhance overall resilience in local systems (Dearing & Cox, 2018). The strong industrial traditions in many Italian provinces set the stage for testing whether widespread access to financial support prompts more collaborative and systemic transitions toward both digital and green practices.

Methodology. *To investigate the adoption of TT practices at the local level, we exploit a novel dataset, the "Place Leaders of Twin Transition in the Italian local manufacturing systems" (PLOTTI) and focus on Italian provinces. Considering the lack of available micro-level data and specific information at the local labour market level, we chose to focus our analysis on Italian provinces. This broader geographic scope allows us to effectively control for local specializations and diverse economic structures, providing a practical and meaningful approach to address the data constraints. By analysing provincial-level data, we can still capture important variations in economic activities and specializations, enabling a comprehensive understanding of regional labour market dynamics despite the absence of more granular data. PLOTTI database draws information from three different main sources: ISTAT business census data, the national database of state aids (Registro nazionale degli aiuti di Stato, RNA), and Moody's AIDA business database. Additional information on provinces is sourced from ISTAT and EUROSTAT.*

From the most recent ISTAT business census, covering approximately 280,000 companies, we use three questions relevant to our conceptualization of TT: one on innovation activities (digital transition), one on environmental sustainability measures (green transition), and one on technologies supporting eco-friendly initiatives (TT).

From the national database of state aids (RNA), PLOTTI contains information on aids to Italian companies in the period 2014-2024 that have a match to AIDA business database. From the initial 63,302 aids, PLOTTI contains 45,976 aids to 34,917 companies. Each of these aids has been classified in digital (i.e. 81.9%), green (10.4%) or twin 2.7% domains.

Our empirical approach is summarized by the following model:

*Y_pk = f(HHI_p; X_p; Z_p; W_pm*Y_m),*

where Y_pk represents the percentage of firms in province p that have implemented initiative k (i.e., digital, green, or twin). Regressors are 1-year lagged. Our main variable of interest is HHI_p, which is a Herfindahl-Hirschman index capturing the dispersion of public funds in province p among firms, based on total amount (i.e. HHI_amount) and number (HHI_number) of financings received. X_p includes provincial-level variables to control for the number of industrial districts embedded in the province p, economic size, agglomeration economies, specialization, and innovation propensity. Z_p comprises variables built on firm data that received the aids and aggregated at the level of the province: average firm size (using total assets), share of firms in knowledge-intensive manufacturing sectors, and the Shannon Entropy Index for sectoral specialization. Finally, W_pm is a distance matrix measuring the spillover effects from neighbouring province m's adoption rate Y_m. The econometric strategy employs a cross-section baseline model where Y_pk is estimated through OLS; in addition, spatial spillovers in either dependent variable or residuals (or both) are accounted for by means of Spatial Lag Model, Spatial Error Model or Spatial Durbin model.

Results. *We present some exploratory and preliminary results. Tab. 1 shows the distribution across provinces of the three outcome variables and other important independent variables.*

As expected, a larger share of firms is engaged in initiatives to reduce the environmental impact of their economic activities, about 1 out of 5 (i.e. 21.94%). By contrast, the adoption of advance digital technologies is less pervasive, with only 4.73% of firms using it. Accordingly, TT firms account for only 1.85% on average. Tab. 1 also shows the top five provinces with the highest scores in each category: Digital, Green and TT. It is interesting to observe that the provinces vary across categories, and there is no clear divide between North, Centre and South of Italy. In terms of regions, Calabria, Lombardy, and Veneto consistently appear in the top five, though with different corresponding provinces.

The variables "HHI_funds" and "HHI_number" measure the Herfindahl-Hirschman Index (dispersion of public funds) based on the amount and the number of financings received by the provinces between 2019 and 2021, respectively. The difference between the average values of the two is mainly due to the fact that some provinces never received any financing (i.e., HHI_number equals zero), which affects the calculation results. Nevertheless, the dispersion of financing amounts across provinces is notably larger than the dispersion in the number of financings to firms, which in many cases received just one aid. The higher standard deviation (SD = 0.1679) for HHI_amount also indicates greater variability in the concentration of funding amounts. In contrast, HHI_number has a smaller SD (0.0507), reflecting that, in most provinces, financing is either absent or more evenly distributed. The median values further reinforce this pattern, with HHI_number being close to zero in many cases. Moreover, the HHI_amount is highest in provinces such as Lucca, Firenze, and Pisa (all in Tuscany), suggesting that financing amounts in these areas are more concentrated among fewer recipients, while the HHI_number is led by Caltanissetta and Messina (Sicilia), as well as Brindisi (Puglia), indicating that in the South of Italy, the number of financings is more unevenly distributed across firms, with some receiving significantly more support than others.

Finally, we consider the number and the total amount of financings received by each province between 2019 and 2021 (variable "NFin19_21" and "TotFin19_21"), as well as the number of industrial districts in each province (variable "Industrial district"). As we can observe, the mean number of financings per province (148.90) is notably higher than the median (83), indicating a right-skewed distribution, where a few provinces receive significantly more financings than others. This is further reflected in the high standard deviation (SD = 273.98), showing considerable variability across provinces. The total financing amounts exhibit even greater disparity, with an average of approximately €5.58 million, but a median of only €1.37 million. The high standard deviation (€11.28 million) suggests that some provinces received disproportionately large amounts, while many others received much less. The provinces with the highest numbers of financings are mostly large economic hubs like Rome, Milan, and Brescia, along with Bolzano and Genoa, which may reflect strong economic activity and government funding availability. Additionally, the top recipients of total financing include Rome, Milan, and Turin, which are among Italy's major economic and financial centers, along with Naples and Brescia, likely due to the presence of large-scale industries and infrastructure projects.

To conclude, the number of industrial districts per province is quite low on average (1.33) and has a median of 1, meaning that many provinces have either one or no industrial districts. The high standard deviation (1.83) suggests that some provinces have significantly more industrial districts than others, creating a highly uneven distribution. The provinces with the highest number of industrial districts are Ravenna (Emilia-Romagna), Sondrio (Lombardy), and Bergamo (Lombardy), reflecting the strong manufacturing and industrial tradition in these regions. Interestingly, Isernia (Molise) and Reggio di Calabria (Calabria) appear in the top five, which indicate the relevance of specialized industrial clusters even in these peripherical areas.

Tab. 1 - Summary statistics of main variables

Variable	Obs.	Mean	Median	SD	Top 5 Provinces (with Region)
Digital	107	4.73	4.44	1.63	Bergamo (Lombardia) Sassari (Sardegna) Treviso (Veneto) Cosenza (Calabria) Isernia (Molise)
Green	107	21.94	21.66	3.98	Crotone (Calabria) Lodi (Lombardia) Pisa (Toscana) Treviso (Veneto) Reggio nell'Emilia (Emilia-Romagna)
TT	107	1.85	1.60	1.10	Treviso (Veneto) Cosenza (Calabria) Barletta-Andria-Trani (Puglia) Varese (Lombardia) Chieti (Abruzzo)
HHI_amount	107	0.1837	0.1246	0.1678	Lucca (Toscana) Brindisi (Puglia) Firenze (Toscana) Parma (Emilia-Romagna) Pisa (Toscana)
HHI_number	107	0.0360	0.0138	0.0507	Caltanissetta (Sicilia) Messina (Sicilia) Brindisi (Puglia) Oristano (Sardegna) Barletta-Andria-Trani (Puglia)
NFin19_21	107	148.90	83	273.98	Roma (Lazio) Milano (Lombardia) Brescia (Lombardia) Bolzano/Bozen (Trentino-Alto Adige) Genova (Liguria)
TotFin19_21	107	5582047.82	1365739.21	11276256.98	Roma (Lazio) Torino (Piemonte) Milano (Lombardia) Napoli (Campania) Brescia (Lombardia)
Industrial district	106	1.33	1	1.83	Ravenna (Emilia-Romagna) Sondrio (Lombardia) Isernia (Molise) Bergamo (Lombardia) Reggio di Calabria (Calabria)

Tab. 2 shows the correlation between the key variables discussed above, providing valuable insights into the relationships among digital adoption, green practices, funding dispersion, and industrial structure. First, we observe that, although positive and statistically significant, the correlation between provinces with higher shares in both Digital and Green are relatively low (0.34). This suggests that while firms investing in digital technologies are somewhat more likely to engage in green initiatives, the two trends do not always move together. Structural or sectoral differences across provinces may explain why some regions focus more on one aspect than the other. Secondly, funding dispersion seems to matter: provinces with a more dispersed distribution of public funds (a lower HHI_Num) show higher adoption rates for digital technologies. This outcome is consistent with the idea that inclusivity in funding fosters broader learning effects and encourages multiple actors to experiment with digital solutions. TT Adoption is more strongly linked to Digital than Green practices: the correlation between TT and Digital (0.60, p = 0.0000) is notably stronger than that between TT and Green (0.25, p = 0.0089).

Amount and number of financings play a role, but are not the only determinants of technological adoption: total financing amount (TotFin19_21) show weak to moderate positive correlations with Digital (0.22), but the strongest correlation in this category is between NFin19_21 and TotFin19_21 (0.79, p = 0.0000), which may indicate that provinces receiving more financings tend to also receive larger total amounts. However, these financings do not necessarily translate into a proportionate increase in digital or green technology adoption.

Finally, the number of industrial districts per province correlates positively with Digital (0.27, p = 0.0052) and Green (0.33, p = 0.0006), both statistically significant relationships. This suggests that provinces with a stronger industrial base tend to have higher adoption of both digital and green technologies, likely due to better infrastructure, knowledge-sharing networks, and a culture of innovation. The positive, though weaker, correlation between industrial districts and TT (0.23, p = 0.0164) indicates that technology -driven sustainability solutions are also somewhat more prevalent in industrial regions, although this relationship is not as pronounced as for general digital technologies.

Tab. 2 - Correlation table

	Digital	*Green*	*TT*	*HHI_amount*	*HHI_number*	*NFin19_21*	*TotFin19_21*	*Industrial district*
Digital	1.0000							
Green	0.3477 0.0002	1.0000						
TT	0.5967 0.0000	0.2516 0.0089	1.0000					
HHI_amount	-0.1261 0.1957	0.0075 0.9389	-0.0502 0.6076	1.0000				
HHI_number	-0.2968 0.0019	-0.1009 0.3011	-0.0713 0.4654	0.4035 0.0000	1.0000			
NFin19_21	0.1794 0.0645	0.0706 0.4697	0.0777 0.4262	-0.2415 0.0122	-0.2964 0.0019	1.0000		
TotFin19_21	0.2201 0.0227	0.1477 0.1290	0.0988 0.3115	-0.0850 0.3839	-0.2588 0.0071	0.7903 0.0000	1.0000	
Industrial district	0.2693 0.0052	0.3280 0.0006	0.2326 0.0164	-0.2085 0.0319	-0.2670 0.0057	0.2047 0.0353	0.1559 0.1104	1.0000

While the analysis is still ongoing, we can present some preliminary results.

As for the role of industrial districts, we observe that while industrial districts have historically spurred innovation, our preliminary evidence does not uniformly show that simply having a district is enough to drive TT adoption. Contextual factors such as type of specialization, local leadership, and synergy among district firms seem to be critical. Some industrial districts appear dynamic and receptive to TT, while others may be locked into established routines.

We also observe variation in Twin Adoption. The twin dimension, where digital innovation explicitly supports sustainability objectives, remains the smallest share among the three categories (digital, green, twin). Even among provinces with vigorous digital ecosystems, the percentage of firms that apply those digital tools specifically to reduce environmental impacts tends to be relatively limited (often below 2-3% at the provincial level, as shown in ISTAT'). This gap highlights the potential for more explicit policy measures that tie digital strategies to green outcomes.

These insights resonate with existing literature stressing that the success of TT depends on the ability of local systems to harness knowledge spillovers and coordinate across multiple stakeholders (Sareen & Haarstad, 2021; Montresor & Vezzani, 2023). Moreover, they reinforce the idea that the local design and delivery of public funds, beyond mere volume, can shape the scale and speed of TT adoption.

Research limitations. *While PLOTTI offers extensive multilevel- data, it does not account for qualitative factors such as managerial perceptions or organizational culture that encourage or discourage radical innovation. Such qualitative dimensions are critical in understanding the full complexity of TT adoption, particularly in industrial districts (Bellandi et al., 2019). Future studies may want to adopt a mixed methods approach to fully capture alternative qualitative dimensions.*

Additionally, while the combination of ISTAT's business census questions and the RNA classification (digital, green, twin) provides a helpful framework, these categorizations may not fully reflect the complexity of integrated solutions. Some firms may practice partial digitalization or modest environmental improvements that do not neatly fall into the twin category.

Finally, there are potential endogeneity concerns. The degree of funding dispersion itself might be influenced by local institutional strength or pre-existing relationships between firms and public agencies (Pfeffer, 1972). Although we partially address this issue with robust controls, the results may still reflect underlying selection biases. Future research might leverage instrumental variables or differences in regional policy rules to isolate more precise estimates.

Managerial implications. *The findings of this study carry significant relevance for policy and managerial practice in local manufacturing contexts. In particular, the evidence highlights the value of inclusive funding strategies: distributing resources across a broader range of firms fosters widespread innovation uptake, rather than concentrating opportunities among a few dominant players. Such an approach may prove especially beneficial in manufacturing-based local production systems, where multiple specialized firms operate in interconnected value chains.*

Further, place-based leadership emerges as critical. Local governments, trade associations, and development agencies can play a key role by organizing collective training on digital platforms specifically linked to sustainability

objectives. By lowering the perceived risks of innovation and fostering knowledge exchange, such initiatives can accelerate TT adoption, particularly in manufacturing clusters where firms may otherwise hesitate to integrate digital tools for green purposes.

Beyond individual provinces, stronger regional coordination can enhance knowledge spillovers and accelerate TT adoption. Initiatives such as shared pilot programs and cross-province consortia can drive innovation, particularly in regions where supply chains and industrial networks span multiple administrative areas.

A key priority is bridging the gap between digital and environmental goals by crafting policies that explicitly tie digital investments to sustainability outcomes. Ensuring that technological adoption supports both competitiveness and ecological benefits can strengthen the case for TT adoption across diverse sectors.

Finally, for manufacturing systems with deep-rooted traditional methods, a stepwise approach can facilitate transition: starting with simpler digital solutions enables firms to build confidence and technical capacity, creating a foundation for progressively integrating advanced green practices. This gradual pathway can help mitigate resistance and ensure long-term TT adoption.

Originality of the paper. *This research advances the existing literature by examining TT through a provincial lens in Italy, where manufacturing-based local production systems offer a distinctive environment for innovation and sustainability (Bianchini et al., 2023; Montresor & Vezzani, 2023). Rather than zeroing in on single-firm analyses, we bring to light how place-based factors, such as funding policies, and industrial district organization, shape the collective capacity to integrate digital and ecological goals.*

Moreover, our emphasis on public funding dispersion adds a novel dimension to debates about effective policy design for fostering inclusive innovation. By systematically investigating whether dispersed funding correlates with broader TT adoption, we provide evidence that goes beyond the total funding volume to illustrate how resource allocation patterns matter for local production systems. Coupled with spatial econometric approaches, this analysis underscores the importance of knowledge diffusion and cross-province interactions, potentially informing decision-makers who seek to structure policies that spur regionally cohesive, green-digital transformations.

While focused on Italy, the methodological insights and policy lessons extend to other contexts that feature strong industrial clusters or local manufacturing ecosystems, highlighting the role of territorial conditions in orchestrating large-scale technological and environmental transitions (Rogers, 1962; Geels, 2011).

Key words: *Twin Transition; Digitalization; Sustainability; Local Production Systems; Public Funding; Spatial Econometrics*

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Pressioni competitive e comunicazione del rischio etico: Un'analisi preliminare del mercato della Intelligenza Artificiale Generativa

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Abstract. *Questo lavoro si propone di indagare come le dinamiche competitive associate all'ingresso nel mercato e allo sviluppo di nuove tecnologie di Intelligenza Artificiale Generativa (GEN-AI) configurano l'inquadramento dei rischi legati ad esse nelle comunicazioni pubbliche delle imprese. Concentrandoci sulle imprese che sviluppano modelli linguistici generici di grandi dimensioni, attraverso un'analisi qualitativa longitudinale, sviluppiamo un modello processuale che traccia l'evoluzione delle narrative di rischio nel tempo e mettiamo in luce le principali differenze negli approcci di comunicazione e nelle strategie di gestione del rischio. Quest'analisi offre in definitiva una visione sull'evoluzione delle strategie competitive in un ambito tecnologico in rapida ascesa e trasformazione. Dimostriamo che le imprese adeguano dinamicamente la loro definizione del rischio in risposta alle dinamiche di mercato e alle strategie delle imprese in concorrenza, trasformando la comunicazione del rischio da un requisito di conformità passiva a un fattore proattivo per il conseguimento di un vantaggio competitivo. Questa ricerca contribuisce alla letteratura tradizionale sulle strategie non di mercato integrando aspetti etici e di comunicazione strategica*

Framing of the research. *Il rapido avvento delle tecnologie di GEN-AI non solo ha ridefinito i tradizionali panorami competitivi (Hinds and von Krogh, 2024; Ostler, 2025) ma, ancor più rilevante, ha introdotto una complessa serie di rischi profondi che le imprese devono gestire attraverso le loro comunicazioni pubbliche. La GEN-AI presenta rischi che sono sia poliedrici (dal punto di vista qualitativo) sia senza precedenti nella loro portata (dal punto di vista qualitativo). Ad esempio, i bias algoritmici sottesi alla GEN-AI possono perpetuare o esacerbare le disuguaglianze sociali esistenti (Raisch and Krakowski, 2021), mentre le violazioni della privacy rappresentano minacce che compromettono la riservatezza individuale e d'impresa in modi finora inediti (Moser et al., 2023). Inoltre, il potenziale uso improprio dei contenuti generati dall'IA per diffondere disinformazione o manipolare l'opinione pubblica è stato descritto come una sfida paradigmatica per le istituzioni democratiche (Larson et al., 2024). In aggiunta, la GEN-AI comporta rischi significativi per la sicurezza, poiché le sue capacità potrebbero essere sfruttate per attacchi informatici o altre attività pericolose, presentando minacce che si estendono ben oltre l'ambito dei pericoli tecnologici tradizionali (Lindebaum et al., 2023).*

L'espansione delle tecnologie GEN-AI ha intensificato la valutazione pubblica sulle dimensioni etiche dell'implementazione tecnologica stimolando una rinnovata attenzione sulla comunicazione etica. Questioni come la disuguaglianza sociale, i pregiudizi algoritmici e il diritto alla riservatezza non sono semplicemente sfide tecniche o operative poiché esse generano immense e profonde implicazioni sociali (Autor, 2015; Floridi, 2023; Hu et al., 2021). Di conseguenza, gli stakeholder sono sempre più interessati affinché le imprese aderiscano a rigorosi impegni etici, riconoscano le proprie responsabilità e forniscano informazioni trasparenti sui rischi. Tuttavia, in un ambiente caratterizzato da rapidi cambiamenti e alta incertezza, il modo in cui le imprese comunicano sui potenziali pericoli assume un significato strategico. Così, nel contesto della GEN-AI, l'inquadramento del rischio può evolversi da requisito di conformità passiva a comportamento strategico proattivo. Scegliendo di enfatizzare o minimizzare l'attenzione su particolari rischi, le imprese condizionano le percezioni degli stakeholder, rafforzano la fiducia degli investitori e - talvolta - persino informano gli orientamenti normativi (Hardy et al., 2020).

Le tecnologie GEN-AI stanno rimodellando i mercati e sfidando i modelli strategici consolidati generando, sia opportunità senza precedenti sia nuove incertezze (Hinds and von Krogh, 2024; Ostler, 2025). In questo contesto, gli imperativi per un rapido ingresso nel mercato e un'innovazione continua-come sottolineato da Baum e Korn (1996) e Smith et al. (1991) - sono sempre più intrecciati con la necessità di gestire rischi emergenti, come minacce alla cybersecurity *e problemi di* privacy *dei dati (Hu et al., 2021; Krakwoski, 2021). Queste duplici sfide costringono le imprese non solo a investire in tecnologie all'avanguardia, ma anche a elaborare narrative pubbliche finalizzate a comunicare i loro approcci alla gestione di questi rischi.*

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Muovendoci da questa prospettiva, non sorprende che le considerazioni etiche siano parte integrante della comunicazione del rischio nell'ambiente della GEN-AI. Gli stakeholder si aspettano che le imprese affrontino questioni come l'equità, i bias e la responsabilità sociale insieme alla gestione tecnica del rischio (Autor 2015; Floridi, 2023). Incorporando questi impegni etici nelle loro comunicazioni pubbliche, le imprese non solo mitigano i rischi reputazionali, ma promuovono anche la fiducia pubblica. Pertanto, l'inquadramento del rischio nel contesto della GEN-AI svolge un duplice ruolo, da un lato, è uno strumento strategico per la differenziazione competitiva, dall'altro lato, rappresenta un meccanismo per la responsabilità etica.

Osservando il fenomeno da una prospettiva competitiva, l'inquadramento del rischio agisce come una leva competitiva. Le ricerche di Chen e al. (2007) mostrano che le comunicazioni strategiche possono influenzare significativamente le percezioni del mercato, mentre Ostler (2025) evidenzia le sfide che le imprese affrontano quando entrano in mercati volatili. Ad esempio, un nuovo entrante nel mercato della GEN-AI potrebbe enfatizzare le proprie misure proattive di gestione del rischio per segnalare la propria prontezza nell'affrontare incertezze normative e di mercato, costruendo così credibilità. Al contrario, un'impresa consolidata potrebbe mettere in primo piano i suoi consolidati protocolli di gestione del rischio per rafforzare la propria leadership e garantire la fiducia degli investitori. In entrambi i casi, emerge che la costruzione deliberata di narrative sul rischio è centrale per plasmare il vantaggio competitivo.

Più nello specifico, attingendo dalla ricerca sulle dinamiche competitive (Chen et al., 2007; Ostler, 2025), sull'inquadramento del rischio (Hardy et al., 2020) e sulla comunicazione etica (Floridi, 2023; Autor, 2015), il nostro obiettivo finale è quello di fornire un framework che spieghi come le imprese navigano i duplici imperativi dell'innovazione e della gestione del rischio sfruttando le narrative sul rischio per influenzare le percezioni degli stakeholder, garantire un vantaggio competitivo e sostenere standard etici. Questa prospettiva integrata non solo amplia la teoria della strategia competitiva incorporando azioni non di mercato, ma arricchisce anche la letteratura sull'etica d'impresa con una comprensione sfumata delle divulgazioni etiche dei rischi come asset strategici deliberati. Infine come dimostrato da Hardy et al. (2020), una comunicazione efficace del rischio è cruciale non solo per salvaguardare la reputazione d'impresa, ma anche per proteggere la sicurezza e l'incolumità pubblica. Le imprese, quindi, affrontano scelte strategiche con profonde implicazioni competitive. Nel nostro framework, infatti, l'inquadramento del rischio è concettualizzato come uno strumento dinamico che adempie sia a funzioni competitive sia etiche.

Purpose of the paper. *Concentrandosi sull'inquadramento dei rischi nelle comunicazioni pubbliche delle imprese, questo studio cerca di far progredire la nostra comprensione delle dimensioni strategiche sottostanti all'inquadramento del rischio da parte delle imprese nel settore della GEN-AI. Studi recenti indicano che le imprese non divulgano i rischi come un obbligo di conformità o etico; piuttosto, costruiscono attivamente narrative sui rischi per gestire le percezioni degli stakeholder, influenzare le risposte normative e sostenere la legittimità di mercato (Hardy et al., 2020). È opportuno mettere in risalto che il modo in cui i rischi vengono comunicati-se vengono minimizzati, enfatizzati o reinterpretati contestualmente- rappresenta sia la leva competitiva sia l'impegno etico verso la trasparenza e la protezione degli stakeholder. Le imprese che entrano nel mercato della GEN-AI affrontano intense pressioni competitive per affermare la propria leadership tecnologica e, contemporaneamente, gestire questi rischi. Sebbene la letteratura sulle dinamiche competitive (Chen, 1996; Chen et al., 2007; Tsai et al., 2011) abbia documentato come le imprese rispondano alle pressioni di mercato attraverso una rapida innovazione e un riposizionamento strategico, esiste una notevole lacuna nella comprensione di come questi imperativi competitivi influenzino l'articolazione di tali rischi significativi nelle comunicazioni pubbliche. Questo lavoro mira a colmare questa lacuna rispondendo alla seguente domanda di ricerca: In che modo le dinamiche competitive associate all'ingresso nel mercato e allo sviluppo di nuove tecnologie GEN-AI influenzano l'inquadramento dei rischi correlati a queste tecnologie nelle comunicazioni pubbliche delle imprese?*

Considerati gli impatti trasformativi e potenzialmente destabilizzanti della GEN-AI, la posta in gioco è straordinariamente alta: una comunicazione efficace del rischio non è solo una questione di legittimità di mercato, ma anche di sicurezza e protezione pubblica. Questa riflessione, infatti, unitamente alla rapida e sfidante evoluzione del settore della GEN-AI sottolinea l'importanza e l'urgenza di capire in che modo le dinamiche competitive associate all'ingresso nel mercato e allo sviluppo di nuove tecnologie GEN-AI influenzano l'inquadramento dei rischi correlati a queste tecnologie nelle comunicazioni pubbliche delle imprese.

Methodology. *Data la limitata ricerca che indaga come le dinamiche competitive plasmino il modo in cui le imprese inquadrino e comunichino i rischi relativi alle tecnologie GEN-AI, abbiamo adottato uno studio comparativo di casi longitudinale e induttivo (Eisenhardt, 1989). Abbiamo scelto un approccio comparativo per sviluppare una teoria più generalizzabile identificando schemi comuni. Abbiamo impiegato un approccio longitudinale per investigare i fattori scatenanti e i meccanismi che spiegano le variazioni nei suddetti schemi nel corso del tempo (Langley, 1990).*

In particolare, per rispondere alla nostra domanda di ricerca, ci siamo concentrati sulle dinamiche competitive a partire dal 2018, quando Google ha presentato il primo prototipo di GEN-AI, aprendo così il settore della GEN-AI. Abbiamo quindi selezionato/escluso imprese che sono entrate nel mercato GEN-AI sulla base dei seguenti criteri:

1. *abbiamo selezionato imprese che hanno sviluppato modelli linguistici di grandi dimensioni (LLM) per uso generale. Rispetto a LLM domain specific, infatti, affrontano rischi maggiori a causa di complessità tecniche (Schwartz et al., 2020; Yao et al., 2023) ed etiche (Cui et al., 2024) più elevate.*

2. *tra le imprese che sviluppano LLM per uso generale, abbiamo selezionato esclusivamente quelle che hanno prodotto la loro tecnologia internamente. Questo criterio è essenziale perché solo le imprese che controllano direttamente lo sviluppo dei loro modelli possono affrontare, e sono quindi responsabili, delle sfide e dei rischi associati attraverso efficaci strategie di mitigazione.*
3. *abbiamo incluso solo quelle imprese che possedevano almeno due documenti accessibili pubblicamente contenenti comunicazioni esplicite riguardanti i rischi.*
4. *abbiamo escluso le imprese che hanno sviluppato solo versioni beta dei loro modelli. Le versioni beta sono, infatti, soggette ad aggiornamenti continui e, pertanto, non forniscono dati stabili e comparabili.*

Questi criteri di selezione hanno portato a includere nel nostro studio le seguenti imprese: Aleph Alpha, Anthropic, Baidu, Cohere, DeepSeek, Google, Meta, Mistral, OpenAI e Zhipu AI. Per ciascuna delle imprese abbiamo raccolto dati utili a esaminare come esse hanno comunicato e inquadrato i rischi legati all'IA. In particolare, abbiamo raccolto informazioni da documenti pubblicati sui siti web ufficiali delle imprese selezionate e da articoli di giornale provenienti da fonti affidabili (ad esempio, The New York Times e Bloomberg). L'integrazione degli annunci delle imprese con la copertura mediatica esterna ha supportato una valutazione completa dell'ambiente competitivo in cui queste imprese operano, facendo luce sulle loro scelte strategiche, investimenti e risposte alle pressioni normative.

Inoltre, abbiamo raccolto dati dai siti web ufficiali delle imprese campionate e dai repository GitHub. Nella nostra analisi, queste comunicazioni rappresentano segnali strategici e riflessioni sul posizionamento etico delle imprese. Abbiamo analizzato, quindi, questi materiali per cogliere come le imprese inquadrano i rischi legati all'IA nelle loro comunicazioni pubbliche in risposta alle dinamiche competitive associate all'ingresso nel mercato e allo sviluppo di nuove tecnologie GEN-AI. Come fase preliminare della ricerca per identificare un insieme rilevante di parole chiave utili alla raccolta dei dati, abbiamo inizialmente esplorato le comunicazioni di due imprese: OpenAI e Anthropic. Abbiamo selezionato queste imprese per il volume esteso, l'accessibilità e la ricchezza della loro documentazione pubblicamente disponibile, che ha fornito una solida base empirica per rilevare modelli linguistici ricorrenti nella comunicazione del rischio dell'IA.

Nella fase iniziale, abbiamo utilizzato ChatGPT per analizzare i dati ed estrarre le parole chiave più rilevanti relative ai rischi dell'IA. Questo approccio si è allineato con la metodologia adottata da Bijker et al. (2024), che hanno utilizzato ChatGPT per identificare unità di significato condensate nei dati testuali prima di condurre una codifica qualitativa manuale. L'insieme preliminare di parole chiave risultante (ad esempio, "safety", "responsible", "policy", "misuse", "debug", "risk", "regulation", "transparency", "bias", "alignment") è servito come punto di riferimento iniziale per strutturare la raccolta di dati tra tutte le imprese analizzate. Complessivamente, abbiamo selezionato 296 documenti.

Per l'analisi dei dati abbiamo utilizzato un approccio induttivo ispirato ad una prospettiva processale. La procedura analitica è stata strutturata in fasi iterative tipiche della ricerca qualitativa, progettate per rivelare processi evolutivi complessi: Fase 1: Ricostruzione Cronologica di Eventi e Comunicazioni; Fase 2: Analisi Preliminare dell'Inquadramento del Rischio; Fase 3: Identificazione di Strategie Comunicative e Risposte Competitive; Fase 4: Determinazione delle Dinamiche Competitive e dei Cambiamenti nell'Inquadramento; Fase 5: Sviluppo di un Modello Processuale.

Results. *La ricerca - ancora in fieri - è attualmente ad uno stage embrionale di riflessione sugli agli aspetti teorici e metodologici. Attraverso un'analisi qualitativa longitudinale, miriamo a sviluppare un modello processuale che esplorerà l'evoluzione delle narrative sul rischio nel tempo.*

In nuce, *come risultati attesi del nostro studio, prevediamo innanzitutto di documentare come le imprese che sviluppano LLM per uso generale utilizzino l'inquadramento del rischio non solo per adempiere a requisiti normativi, ma come vero e proprio asset strategico per costruire fiducia, differenziarsi nel mercato e influenzare le percezioni degli stakeholder. Ci aspettiamo di osservare un diverso* framing *dei rischi da parte delle imprese oggetto di studio che illustri l'evoluzione di questa comunicazione nel tempo in relazione alla concorrenza e ai progressi tecnologici.*

La ricerca dovrebbe mostrare come un'impresa che comunica proattivamente le proprie strategie di gestione dei rischi possa essere percepita come più affidabile e innovativa, posizionandosi favorevolmente nel panorama competitivo a seconda di una diversa gestione delle narrative sui rischi e le sfide etiche.

Prevediamo, inoltre, di rivelare come le considerazioni etiche e competitive si intreccino nella comunicazione del rischio, dimostrando che le imprese che integrano efficacemente divulgazioni etiche nelle loro strategie comunicative possano costruire fiducia a lungo termine e consolidare la propria posizione di mercato.

Dallo stato attuale del lavoro di ricerca prevediamo di dimostrare che la gestione e comunicazione del rischio operi in maniera idiosincratica rispetto al posizionamento strategico dell'impresa, con l'emergere di pattern simili nell'approccio al rischio tra imprese con posizionamento strategico comparabile. Questa osservazione potrebbe confermare come le dinamiche di rischio e le implicazioni etiche, intese come strategie non di mercato, svolgano un ruolo determinante nella competizione in ambienti altamente dinamici come quello delle tecnologie generative.

Infine, ci aspettiamo che i risultati estendano i tradizionali paradigmi di strategia non di mercato, integrando aspetti di comunicazione etica e strategica, e arricchiscano la letteratura attuale sulle dinamiche competitive (Chen et al., 2007) e sulla comunicazione del rischio nel settore della GEN-AI.

Research limitations. *Il presente studio non è scevro da limitazioni che potrebbero essere affrontate in ricerche future. La nostra analisi si concentra principalmente sulle imprese che sviluppano LLM per uso generale, lasciando spazio per estendere l'indagine ad altri attori dell'ecosistema GEN-AI. In particolare, un'espansione rilevante consisterebbe nell'includere le imprese* domain-specific*, le startup e le piattaforme che si occupano esclusivamente dell'integrazione e distribuzione delle tecnologie generative. Tale ampliamento consentirebbe di esaminare come il* framing *del rischio possa variare in questi contesti differenti e di identificare nuove leve strategiche finora non emerse. Un approccio comparativo più inclusivo permetterebbe di completare la panoramica sul tema, offrendo una comprensione più articolata di come le diverse tipologie di attori nel settore GEN-AI gestiscano strategicamente la comunicazione del rischio in relazione al loro posizionamento competitivo e come esigenze specifiche di mercato e non di settore possano alterare in modo diverso tali dinamiche.*

Managerial implications. *Da una prospettiva manageriale, la nostra ricerca aiuta a dimostrare che la comunicazione del rischio va oltre gli obblighi etici o normativi, rappresentando un asset strategico attraverso il quale le imprese possono posizionarsi e differenziarsi sul mercato. I manager devono bilanciare la spinta all'innovazione con la necessità di costruire la fiducia degli stakeholder. Adottando il nostro quadro, i manager possono valutare sistematicamente quando enfatizzare o minimizzare le narrative sul rischio per allinearsi con i loro obiettivi strategici. Ad esempio, i nuovi entranti potrebbero inquadrare i rischi dell'IA come sfide complesse che richiedono collaborazione normativa per costruire credibilità, mentre gli incumbent potrebbero evidenziare la loro competenza consolidata nella mitigazione del rischio per rafforzare la loro leadership di mercato. Questo approccio strutturato consente alle imprese di anticipare le preoccupazioni degli stakeholder, gestire proattivamente i rischi reputazionali e normativi, e differenziarsi in un ambiente sempre più competitivo e scrutinato. Inoltre, il nostro quadro fornisce ai manager strumenti per adeguare dinamicamente il loro inquadramento del rischio in risposta alle condizioni di mercato in evoluzione e alle strategie dei concorrenti, trasformando la comunicazione del rischio da un requisito di conformità passiva a un vantaggio competitivo proattivo.*

Da una prospettiva normativa, questo studio potrebbe fornire approfondimenti sul ruolo della comunicazione strategica nel plasmare le dinamiche di mercato. Piuttosto che prescrivere politiche specifiche, la nostra ricerca potrebbe aiutare gli organismi regolatori e i responsabili politici a valutare le implicazioni competitive dell'inquadramento del rischio e la sua influenza sulle pratiche del settore. Comprendere come le imprese impieghino strategicamente le narrative sul rischio permette ai regolatori di valutare se la comunicazione del rischio viene utilizzata per migliorare genuinamente la trasparenza o come mezzo di posizionamento sul mercato. Questa conoscenza è cruciale per identificare potenziali distorsioni nella public disclosure, garantire che le strategie competitive non fuorviino gli stakeholder e promuovere un ambiente normativo che bilanci gli incentivi all'innovazione con la responsabilità pubblica.

Originality of the paper. *Questo studio ridefinisce l'inquadramento del rischio nel contesto della GEN-AI, trascendendo l'approccio convenzionale della divulgazione come semplice mezzo per ridurre l'asimmetria informativa (Linsley and Shrives, 2006). La nostra ricerca concettualizza, invece, la comunicazione del rischio come un comportamento strategico dinamico in cui le imprese modellano attivamente le loro narrative per rispondere alle pressioni competitive e soddisfare le esigenze etiche (Hardy et al., 2020; Merkl-Davies and Koller, 2012).*

Proprio nell'ambito della GEN-AI, più che in altri ambiti tecnologici, la comunicazione del rischio assume un valore strategico distintivo. Esplorando come le pressioni competitive associate all'ingresso nel mercato e al rapido sviluppo tecnologico modellino questo inquadramento, la nostra ricerca contribuisce alla più ampia letteratura sulla gestione strategica e sull'etica d'impresa. Offriamo nuove prospettive su come le imprese concilino i duplici imperativi dell'innovazione e della mitigazione del rischio in un panorama tecnologico dove la posta in gioco è particolarmente elevata e dove la GEN-AI rappresenta simultaneamente un'opportunità trasformativa e una sfida senza precedenti per le norme sociali e i framework di sicurezza esistenti.

Con l'intensificarsi della regolamentazione e la crescente attenzione sociale all'IA, la nostra ricerca fornisce un contributo essenziale alla comprensione di come le imprese possano navigare le tensioni tra innovazione, competizione e responsabilità etica, trasformando la comunicazione del rischio da mero adempimento normativo a componente centrale della loro strategia competitiva.

Key words: *GEN-AI; business ethics, competitive advantage; risk framing; industry analysis, competitive dynamics*

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