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Original papers research

Useful information for readers and authors

Aphorism

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In true dialogue, both sides are willing to change
(Thich Nhat Hanh)

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AI in Academia: Breakthrough or Black Box Threat to Scientific Integrity? [1]

Alberto Pastore

Introduction

In recent years, the emergence of generative artificial intelligence technologies in the field of academic research has represented one of the fastest and most pervasive changes in the recent history of management sciences. Within an extremely short time span, tools capable of generating text, analyzing large amounts of data, and supporting complex decision-making processes have become firmly embedded in the daily practices of researchers, reviewers, and editors. This transformation is not merely technological: it affects the epistemological, ethical, and methodological foundations of management research.

Leading international scientific journals have taken a stance through guidelines and editorial policies, acknowledging both the transformative potential of AI and its systemic risks, as well as the need to govern its use responsibly. A shared principle clearly emerges from these documents: artificial intelligence can be a powerful support tool for research, but it cannot and must not replace the critical judgment, responsibility, and creativity of the researcher.

AI as a Cognitive Infrastructure for Research

From the perspective of opportunities, artificial intelligence is increasingly taking shape as a true cognitive infrastructure supporting management research. Generative and analytical tools can contribute to all stages of the scientific process: from formulating research questions to literature review, from data analysis to the linguistic revision of manuscripts. In a field such as management, characterized by multidimensional complexity and the growing availability of data, these tools make it possible to accelerate discovery processes, expand the informational base, and identify theoretical connections that may support the identification of theoretical connections that would be difficult to detect through traditional approaches alone.

AI also opens new perspectives for theory building and empirical analysis. The ability to synthesize large amounts of knowledge and identify emerging patterns fosters the development of new theoretical perspectives and new interpretations of managerial phenomena, while advanced analytical techniques allow for more precise examination of

complex and multilevel dynamics. Equally relevant is its contribution to the democratization of research: widely accessible tools can uhelp reduce certain barriers to entry, broaden participation, and promote greater inclusivity within the scientific community.

Risks: Opacity, Bias, and Scientific Integrity

Alongside these opportunities, significant risks emerge that directly challenge the academic community. A first issue concerns the often opaque nature of AI systems—a kind of "black box"—which makes it difficult to understand the processes through which results are generated. This characteristic raises crucial questions in terms of transparency, verifiability, and replicability, which are fundamental pillars of scientific research.

A second set of concerns relates to algorithmic bias and distortions in training data, which can result in misleading interpretations or the unintentional reproduction of stereotypes. As highlighted in the literature on AI ethics, issues such as fairness, accountability, and transparency represent central challenges for the conscious adoption of these technologies. These concerns are particularly relevant in management, a discipline inherently linked to social, cultural, and organizational contexts.

Even more critical are the risks related to research integrity. The uncritical use of AI can foster phenomena such as unintentional plagiarism, misattribution of ideas, standardization of contributions, and—in the most extreme cases—the production of inadequately verified results that bypass scientific validation mechanisms. In this context, trust in scientific output - an essential element of the academic system - may be undermined if rigorous and transparent practices are not adopted. In management research, these risks are heightened by the context-specific nature of data and the inherently interpretive character of organizational phenomena.

Institutional Responses and the Role of Editorial Policies

Responses from academic communities and scientific journals converge around some fundamental principles: transparency, accountability, and the centrality of human contribution. Authors are increasingly required to explicitly declare whether and how they have used artificial intelligence tools, while retaining full responsibility for the accuracy, originality, and integrity of the content produced.

At the same time, particular attention is paid to safeguarding the peer review process, ensuring data confidentiality, and preventing the improper use of AI in manuscript evaluation. This outlines a framework in which artificial intelligence is recognized as a useful resource, but one that must be integrated within a system of established rules and values.

However, recent evidence suggests that these policies, although widespread, do not always translate into effective practices of disclosure and control, highlighting a gap between formal regulation and actual behaviors within the scientific community. This misalignment points to the need for a more proactive role of editorial policies, which should not only prescribe acceptable uses of AI but also foster responsible adoption through clearer operational guidelines, reviewer awareness, and mechanisms of accountability.

The Policy of Sinergie Italian Journal of Management

In this context, *Sinergie Italian Journal of Management* has recently introduced its own policy on the use of artificial intelligence in research and editorial processes. This policy aligns with international best practices and is based on several key principles.

First, the use of generative AI tools is permitted for authors only for linguistic improvement and, where appropriate, for data analysis, provided that the underlying methods are fully documented, reproducible, and transparently reported. Any such use must be explicitly declared in the cover letter and in an "AI Statement" section of the manuscript. Second, it is reiterated that AI cannot be considered a co-author, as it lacks the responsibility and accountability required for scientific authorship. Authors are expected to provide sufficient detail on the type of AI tools used, their function, and the extent of their contribution, to ensure transparency and reproducibility. The policy also emphasizes that ultimate responsibility for the content rests entirely with the authors, who remain fully accountable for all aspects of the work, including those supported by AI tools.

Regarding the review process, the use of generative AI tools for the analysis of unpublished manuscripts is prohibited, in order to preserve confidentiality and protect intellectual property. This restriction does not apply to standard editorial tools already integrated into journal workflows (e.g., plagiarism detection systems).

Toward a New Epistemology of Management?

The adoption of artificial intelligence in academic research is not merely a technical or regulatory issue, but raises deeper questions about the very nature of knowledge in the field of management. In a context characterized by increasing informational abundance, it becomes crucial to redefine the distinctive value of scientific contribution and the role of the researcher in society.

The risk lies not only in the improper use of technology, but also in the progressive homogenization of thought, where originality may be indirectly constrained by models trained on existing knowledge. At the same time, significant opportunities arise to rethink disciplinary boundaries, integrate diverse approaches, and address complex problems with new tools.

Ultimately, the future of management research will depend on the ability of the academic community to govern the integration of AI responsibly, preserving rigor, transparency, and integrity, while at the same time leveraging the opportunities offered by these emerging technologies. In this evolving landscape, editorial policies will play a critical role not only as regulatory instruments, but as key mechanisms for preserving the epistemic integrity and distinctiveness of management research.

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Best Paper

Fortune favors the happy mind in the right place: individual and contextual drivers of serendipity in entrepreneurship[1] [2]

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Marco Balzano

Abstract

Frame of the research. *Entrepreneurs often experience serendipity, yet the individual-level conditions that foster such occurrences remain underexplored. Drawing on self-determination theory (SDT), this study situates subjective well-being and environmental context as key antecedents of entrepreneurial serendipity.*

Purpose of the paper. *The purpose of this paper is to empirically examine the relationship between entrepreneurs' subjective well-being and serendipity and to assess how contextual factors, specifically the intensity of third places and walking infrastructure, moderate this association.*

Methodology*. A survey of 609 entrepreneurs across high-income countries provides the empirical basis for regression analyses. Robustness checks using patent registrations further validate the findings.*

Results*. The findings indicate that subjective well-being is positively associated with serendipity. Moreover, the intensity of third places and walking infrastructure strengthens this relationship.*

Research limitations*. The cross-sectional design limits causal inference, and self-reported data may introduce bias. Perceived measures of environmental factors could differ from objective conditions, and cultural variations in subjective well-being and serendipity require further examination.*

Managerial implications*. Policymakers and ecosystem leaders could enhance third places and pedestrian-friendly environments to create contexts in which entrepreneurial talent is more likely to thrive and remain. Venture-support organizations and entrepreneurs can further "design for serendipity" by fostering informal interaction and protecting time for unstructured exploration and reflective detachment from operational tasks.*

Originality of the paper. *This study integrates psychological and contextual perspectives to explain serendipity in entrepreneurship. By linking SDT to serendipity*

[1] **Acknowledgements** I wish to express my gratitude to the participants of the SIMA Conference in Genoa (2025) and of the Academy of Management Meeting in Copenhagen (2025) for their thoughtful comments and insightful questions, which have greatly contributed to the refinement of this manuscript. I am also deeply thankful to Marta Ugolini and Alberto Pastore, Editors-in-Chief of Sinergie Italian Journal of Management, and to Laura Ciarmela, Editorial Assistant, for their kind support and professionalism throughout the publication process.

and emphasizing environmental influences, it extends research on entrepreneurial well-being and opportunity discovery.

Key words: *serendipity; subjective well-being; entrepreneurship; self-determination theory; planned luck; high-income countries*

1. Introduction

A fundamental question in innovation and entrepreneurship concerns why some entrepreneurs are more likely to recognize or discover an opportunity than others (Busch, 2024; Fultz and Hmieleski, 2021). As entrepreneurial activities are permeated by outcome uncertainty (Zellweger and Zenger, 2023), entrepreneurs sometimes unlock unexpected opportunities that result from a confluence of individual-level and contextual-level factors (Dew, 2009), marked by an active role of entrepreneurial agency (Busch, 2024). This confluence of factors indicates that while serendipity (i.e., making valuable, unexpected discoveries) is not deterministic, entrepreneurs can prepare for it to some extent[3].

Studies on serendipity often reveal complementary dimensions of the phenomenon, with Walpolian serendipity occurring during an active search for something else and Mertonian serendipity involving valuable insights emerging without any targeted search (Fultz and Hmieleski, 2021). Scholars have also observed that specific conditions can systematically increase serendipity (for recent reviews, see Balzano, 2022; Busch, 2024). Specifically, research has found that project-level (e.g., Garud *et al.*, 2011), team-level (Kato *et al.*, 2019), firm-level (e.g., Fultz and Hmieleski, 2021), and network-level (e.g., Busch and Barkema, 2022) factors enhance the potential for serendipity to surface.

At the same time, although some scholars have observed that entrepreneurs, as human agents, are the primary architects in building their own luck (Busch, 2024), and that a supportive environment is necessary to help entrepreneurs achieve greater performance (Bergman and McMullen, 2022), there remains a shortage of knowledge on how individual-level and contextual-level factors jointly increase serendipity. Given the growing attention to entrepreneurs' psychological resources and emotions accompanying entrepreneurial efforts (Stephan, 2018; Stephan *et al.*, 2023), this study addresses this gap by focusing on an underexplored individual-level factor: subjective well-being. While entrepreneurial serendipitous outcomes are often linked to traits such as resilience or strategic foresight (Baum and Locke, 2004), subjective well-being has received less attention in discussions of serendipity (Balzano, 2026). This paper argues that entrepreneurs' subjective well-being is positively associated with their serendipity by fostering an exploratory orientation toward opportunities. Subjective well-being alone, however, may not be sufficient to generate serendipity. Psychological resources increase entrepreneurs' readiness

[3] The renowned quote "Fortune favors the prepared mind" by Louis Pasteur, and "Fortune favors the prepared firm", coined by Cohen and Levinthal in 1994, encapsulate the notion that both individuals and organizations can prepare to harness specific types of luck.

to explore, but their behavioral expression depends on environmental affordances that repeatedly trigger interaction and reflection (Modina *et al.*, 2023). Therefore, this study examines contextual conditions that enable entrepreneurs to enact the cognitive and behavioral consequences of well-being, focusing on environments that facilitate social interaction and autonomous reflection. In this vein, the paper also asks: does a regional setting that facilitates social interactions (e.g., with many cafés and restaurants) and individual thinking (e.g., with broad pedestrian areas or parks) further increase serendipity?

Addressing these aspects, the present study leverages self-determination theory (SDT) (Deci and Ryan, 2000; Ryan and Deci, 2000) to investigate the role of entrepreneurs' subjective well-being and the characteristics of the surrounding context. Past studies suggest that "entrepreneurs are less innovative, persistent, and productive when their well-being suffers" (Stephan, 2018; Stephan *et al.*, 2023, p. 554). This study argues that entrepreneurs with higher subjective well-being are more likely to experience serendipity. When entrepreneurs experience elevated levels of subjective well-being, they tend to perceive themselves as competent and effective in their endeavors, a state closely associated with the satisfaction of the need for competence emphasized in SDT (Ryan and Deci, 2017). This heightened sense of competence, in turn, can foster engagement with exploratory ideas, thereby increasing the likelihood of serendipity.

Moreover, as suggested by SDT, motivation is also fundamentally shaped by the satisfaction of two other specific psychological needs: relatedness and autonomy. Relatedness refers to the need for social connection and meaningful relationships, while autonomy denotes the need to feel agency and control over one's actions and environment (Deci and Ryan, 2000). Addressing these needs supports personal growth and adaptive functioning, both positively associated with the entrepreneurial process (Ryan and Deci, 2000). The context in which entrepreneurs operate actively contributes to their sense of relatedness and autonomy and shapes how psychological resources are enacted in practice. Public spaces and infrastructure, in particular, can function as environmental affordances that allow entrepreneurs to translate well-being into social interaction and autonomous thinking (Choi *et al.*, 2024; Oppezzo and Schwartz, 2014). Accordingly, this study focuses on third places and walking infrastructure as two SDT-aligned contextual affordances (relatedness and autonomy) that condition how subjective well-being is translated into serendipitous outcomes.

To test these arguments, data were collected from a unique sample of 609 entrepreneurs across high-income countries, operating in a wide array of industries. The empirical analysis supports the outlined hypotheses, reinforcing the overall idea that subjective well-being represents a form of psychological capital positively associated with serendipity. In doing so, this study offers three main theoretical contributions. First, it enriches understanding of the conditions fostering serendipity in entrepreneurial settings (Busch, 2024; Dew, 2009; Fultz and Hmieleski, 2021). Second, it significantly contributes to the literature on entrepreneurial well-being (Stephan *et al.*, 2023; Wiklund *et al.*, 2019). Third, as the space in which

an entrepreneur lives and operates shapes entrepreneurship (Garud *et al.*, 2014; Pathak, 2021), this study adds to the literature on the relevance of context in entrepreneurship (Autio *et al.*, 2014; Baker and Welter, 2020; Munnia *et al.*, 2024).

Relatedly, the study offers practical implications for ecosystem leaders and policymakers. The findings suggest that, in perceived environments richer in third places and walking infrastructure, entrepreneurs tend to report higher scores for serendipity. While these measures capture subjective perceptions rather than objective urban features, they highlight the importance of how entrepreneurs experience their spatial and social surroundings. Therefore, policymakers might consider designing environments that facilitate such dynamics. Likewise, entrepreneurs should remain mindful of the continuous pursuit of a satisfying personal life to foster serendipity, as well as the importance of a supportive surrounding environment that can meet their needs for relatedness and facilitate their autonomy.

2. Background and hypothesis development

2.1 The positive association between entrepreneurs' subjective well-being and serendipity

In entrepreneurial settings, subjective well-being can shape entrepreneurs' personal and professional outcomes, which, in turn, impact productivity and innovation (Stephan *et al.*, 2023; Wiklund *et al.*, 2019). Here, it is advanced that entrepreneurs' subjective well-being is positively associated with their likelihood of experiencing serendipity. This argument draws on SDT, and specifically on the close interplay between subjective well-being and the satisfaction of the need for competence. SDT conceptualizes the need for competence as an inherent psychological need to feel effective and capable in one's activities (Deci and Ryan, 2000). Satisfying this need is associated with motivation, persistence, and personal growth, fostering self-confidence and curiosity (Deci and Ryan, 1985; Ryan and Deci, 2002; Vansteenkiste and Ryan, 2013). Importantly, SDT suggests that subjective well-being and a person's sense of competence are mutually reinforcing (Reis *et al.*, 2000; Sheldon *et al.*, 1996).

When entrepreneurs experience competence satisfaction, they tend to engage with their environments in more open and inquisitive ways: conditions conducive to both Walpolian and Mertonian serendipity. Walpolian serendipity, which emerges during an active search for something unrelated (Fultz and Hmieleski, 2021), is more likely when entrepreneurs experiment and explore as part of problem-solving and opportunity-seeking. Mertonian serendipity (valuable insights arising without deliberate search) can likewise be enhanced when entrepreneurs are mentally well prepared to recognize meaningful patterns in unexpected situations. Thus, subjective well-being, closely intertwined with the satisfaction of competence, supports receptiveness to novelty and raises the likelihood of serendipity. In SDT terms, well-being is not assumed to

create competence, but to co-emerge with competence satisfaction and signal a psychological state in which exploration becomes more likely. Yet SDT suggests that these psychological resources are expressed through need-supportive affordances, making context a boundary condition for serendipity. This leads to the following hypothesis:

Hypothesis 1 (H1): Entrepreneurs' subjective well-being is positively associated with serendipity.

2.2 The moderating role of third places' intensity

Entrepreneurs with higher subjective well-being may be more cognitively open and motivated; however, the translation of this readiness into serendipitous opportunity recognition depends on whether the environment enables frequent, low-barrier interaction and idea exchange. Third places provide socially embedded settings in which entrepreneurs can encounter diverse perspectives, engage in informal conversations, and recombine insights that would be unlikely to emerge in more closed or routine settings (Pellicano *et al.*, 2017). In SDT terms, third places function as contextual affordances that support relatedness, thereby strengthening the extent to which subjective well-being can be enacted as socially embedded exploration and, ultimately, serendipity.

Following SDT, individuals are driven to satisfy their need for competence as well as their need for relatedness (Ryan and Deci, 2017; Shir *et al.*, 2019). In this perspective, SDT conceptualizes the need for relatedness as an intrinsic desire to establish meaningful connections and to feel a sense of belonging with others (Deci and Ryan, 2000). According to SDT, relatedness reflects the need to feel connected and significant in one's interactions (Shir *et al.*, 2019). Accordingly, the higher the intensity of third places, the greater the opportunities for these interactions (Oldenburg, 1989). Informal "third places," such as restaurants, pubs, and cafés, provide opportunities to interact with others outside of home and work and help "people maintain friendships, exchange ideas, and build community" (Choi *et al.*, 2024, p. 3). Entrepreneurs with higher subjective well-being are more likely to enact exploratory behavior in settings rich in third places, as these environments provide frequent opportunities to satisfy their need for relatedness. This, in turn, may lead to enhanced social engagement and a richer exchange of ideas and experiences, facilitating idea discussion and refinement, which can foster the emergence of valuable and initially unexpected solutions.

Thus, third places shape how subjective well-being translates into serendipity by enabling socially embedded exploration and interaction. Accordingly, the positive relationship between entrepreneurs' subjective well-being and serendipity becomes stronger when entrepreneurs experience a high intensity of third places in their living area. This expectation is rooted in the individual need for relatedness (Ryan and Deci, 2000) and how this interacts with entrepreneurs' subjective well-being. Indeed, individuals experiencing high levels of subjective well-being

may be more inclined to actively seek out and frequently engage in social interactions in third places.

Moreover, for entrepreneurs with higher subjective well-being, the social interactions facilitated by a high intensity of third places trigger informal discussions that can sustain and extend their exploratory ideas. SDT suggests that satisfying the need for relatedness enhances intrinsic motivation and engagement (Ryan and Deci, 2017). In third places, entrepreneurs with high well-being are exposed to diverse perspectives and informal exchanges that can spark new ideas and innovative solutions. Their positive emotional state can create a conducive environment for reflection, allowing them to connect seemingly unrelated ideas and generate novel solutions. The fulfillment of their relatedness need in these socially rich settings ensures that they remain motivated and feel supported in their thinking endeavors. Taken together, these arguments lead to the following hypothesis:

Hypothesis 2 (H2): The positive relationship between entrepreneurs' subjective well-being and serendipity is strengthened (i.e., becomes even more positive) when there is a high intensity of third places in their living area.

2.3 The moderating role of walking infrastructure intensity

Walking infrastructure encompasses pedestrian-friendly environments such as streets, sidewalks, trails, and parks, which support walking and open-air movement (Zandieh *et al.*, 2016). Beyond enabling physical activity, such environments provide recurring opportunities for unstructured reflection and cognitive wandering: conditions associated with creative ideation (Oppezzo and Schwartz, 2014). In SDT terms, walkable environments function as contextual affordances that support autonomy by enabling self-directed movement and low-constraint thinking outside structured work settings. As famously noted by Friedrich Nietzsche (1889), "All truly great thoughts are conceived while walking" (Aphorism 34). Accordingly, walking infrastructure is expected to strengthen the extent to which entrepreneurs can enact exploratory thinking associated with subjective well-being and, ultimately, serendipity.

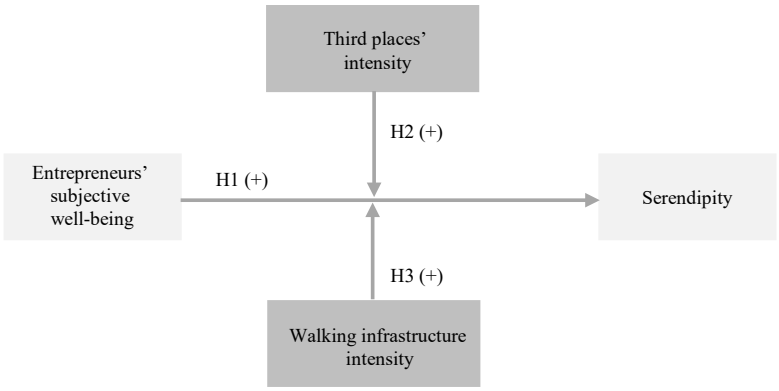
Focusing on the need for autonomy (Ryan and Deci, 2000), it is expected that walking infrastructure provides additional opportunities for entrepreneurs with higher subjective well-being to think autonomously about their ideas, thereby reinforcing the relationship between their subjective well-being and serendipity (Boccoli *et al.*, 2022). As Oppezzo and Schwartz (2014) empirically found, "walking increases creative ideation" (p. 1142). Consistently, an intense walking infrastructure offers a conducive environment for autonomous thinking by providing spaces for self-directed activities. From this perspective, entrepreneurs who experience high levels of subjective well-being have a greater opportunity to translate their reflective thinking into concrete ideas when they have access to ample walking infrastructure. This is because such environments encourage free thought, allowing individuals to generate and elaborate on ideas independently (Gibson, 2018).

The autonomy facilitated by walking infrastructure is thus positively associated with the capacity of entrepreneurs with higher subjective well-being to explore and further develop their thoughts without external constraints. Walking-friendly environments can serve as settings in which entrepreneurs extend and refine their thinking beyond structured work contexts. Walking in relaxed, unstructured environments provides a break from the structured work setting, enabling individuals to process and refine ideas without external pressures (Ferdman, 2023). This supports the natural flow of thought, allowing entrepreneurs to connect disparate ideas and arrive at innovative solutions. Thus, the following hypothesis is proposed:

Hypothesis 3 (H3): The positive relationship between entrepreneurs' subjective well-being and serendipity is strengthened (i.e., becomes even more positive) when there is a high intensity of walking infrastructure in their living area.

Figure 1 illustrates a graphical representation of the research model.

Fig. 1: Research model



Source: author's own elaboration

3. Methods

3.1 Setting, data collection and sample characteristics

This study focuses on high-income, developed countries (World Bank, 2024), reflecting the established connection between national wealth and subjective well-being. While Hagerty and Veenhoven (2003) identify a positive link between income and happiness, the Easterlin Paradox suggests that beyond a certain point, further national wealth does not necessarily equate to increased happiness. Although wealth's influence on subjective well-being varies, focusing on high-income countries provides a consistent basis for comparison, as people in wealthier nations may share

more comparable interpretations of subjective well-being. By limiting the sample to countries where well-being tends to be understood in similar, individual-psychological terms, the study seeks to reduce cultural heterogeneity. This design choice thus enhances construct validity rather than implying that high-income entrepreneurs are necessarily happier than others.

Drawing from prior study designs on related topics (e.g., Fultz and Hmieleski, 2021; Henttonen *et al.*, 2016; Newman *et al.*, 2018), the sample for this study was collected through a survey. For cross-validation purposes, the survey was initially shared for informal feedback with three academics and industry experts and underwent pilot testing with 21 volunteer entrepreneurs. To further enhance reliability, three attention checks were included in the survey. Items were presented in random order, and some were reverse-coded to mitigate response bias (Groves *et al.*, 2011). The survey was administered during the spring and early summer of 2024.

To minimize potential common method bias, it is also worth noting that the research model was never disclosed to participants, avoiding the risk of influencing their responses (Podsakoff *et al.*, 2003). Two strict pre-screening questions were included to ensure the suitability of participants. The first assessed whether respondents were currently active entrepreneurs, while the second required a very high proficiency in English. Only individuals meeting both criteria were allowed to proceed. Participants were required to provide explicit consent to participate. Moreover, all participant data were strictly anonymized and treated with the highest confidentiality, in accordance with international data protection standards. All participants were compensated for their time (Newman *et al.*, 2021).

The time taken to complete the survey was recorded, with results showing that the average duration was under 10 minutes. After removing 15 entrepreneurs who left the survey incomplete and 13 inconsistent observations (i.e., respondents failing the attention checks), the final sample consisted of 609 valid responses. Tab. 1 provides an overview of the sample composition. Participants represented a diverse geographic scope, with entrepreneurs currently active in 21 different countries and across a wide variety of industries.

3.2 Measures

The dependent variable in this study is serendipity, measured through a set of six items adapted from Fultz and Hmieleski (2021). The original scale was designed with "the firm as the main referent" (Fultz and Hmieleski, 2021, p. 6) and included items such as "As we seek to solve one problem, we often discover the solution to a completely different problem" (Walpolian serendipity) and "As we go about our normal business operations, we often discover solutions to problems we weren't originally looking for" (Mertonian serendipity). Similar to the original scale, the adapted items capture both Walpolian and Mertonian serendipity (Dew, 2009; Fultz and Hmieleski, 2021), but were reformulated to use the entrepreneur, rather than the firm, as the main referent. Accordingly, the items include: "When I seek to solve one problem in my business, I often discover a solution

to a completely different problem," "In the course of my daily business activities, I often find solutions to problems I wasn't originally looking for," "I often stumble upon unexpected opportunities for my business," "When I try to solve a particular problem in my business, the solution is often unexpected," "When I solve a problem in my business, the solution is often not what I anticipated," and "I often develop new projects or ideas in ways I could hardly imagine before starting".

Tab. 1: Sample characteristics

Study's participants n = 609					
	n	%		n	%
Gender			*Married*		
Female	296	48.60	Yes	236	38.75
Male	308	50.57	No	373	61.25
Other	3	0.49			
Prefer not to say	2	0.33	*Number of children*		
			0	386	63.38
Age			1	135	22.17
18-30	176	28.90	2	70	11.49
31-40	173	28.41	3	14	2.30
41-50	132	21.67	4	3	0.49
51-60	88	14.45	5	0	0.00
61+	40	6.57	6+	1	0.16
Educational attainment			*Income*		
Primary school or below	5	0.82	Well below the average	33	5.42
Middle or high school diploma	147	24.14	Below the average	119	19.54
Bachelor's degree	299	49.10	Average	275	45.16
Master's / MBA / Executive MBA	120	19.70	Above the average	161	26.44
Doctorate degree	25	4.11	Well above the average	21	3.45
Other/Prefer not to say	13	2.13			
			Currently resident in		
Full-time entrepreneurs			Urban area	446	73.23
Yes	525	86.21	Rural area	163	26.77
No	84	13.79			
			Geographical area		
Number of registered patents			European zone	382	62.73
0	517	84.89	Oceania	33	5.42
1	50	8.21	North America	194	31.86
2	26	4.27			
3	10	1.64			
4	4	0.66			
5+	2	0.33			

Source: author's own elaboration

Consistent with prior research (e.g., Shir *et al.*, 2019), participants rated these items on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). To estimate the latent constructs associated with the survey items, adherence to the statistical principles of congeneric models was maintained, ensuring enhanced accuracy and representativeness in the estimation of latent constructs. For this purpose, the CLC Estimator software (Marzi *et*

al., 2023) was adopted, and the maximum likelihood estimation method was used to impute the weights.

As reported in Tab. 2, the reliability of this scale was confirmed with a Cronbach's alpha of 0.85, indicating high internal consistency. The Average Variance Extracted (AVE) for the serendipity construct was 0.50, suggesting convergent validity. Factor loadings for the items ranged from 0.633 to 0.783, all above the acceptable threshold of 0.50, indicating that each item contributes significantly to the construct (Hair *et al.*, 2010).

Tab. 2: Items and reliability of latent variables

	Factor loadings	Cronbach's alpha	AVE
Subjective well-being (Newman et al., 2018)		0.89	0.64
- In most ways my life is close to my ideal.	0.819		
- The conditions of my life are excellent.	0.804		
- I am satisfied with my life.	0.881		
- So far, I have gotten the important things I want in life.	0.868		
- If I could live my life over, I would change so many things [R].	0.583		
Serendipity (adapted from Fultz and Hmieleski, 2021)		0.85	0.50
- When I seek to solve one problem in my business, I often discover a solution to a completely different problem (W).	0.746		
- In the course of my daily business activities, I often find solutions to problems I wasn't originally looking for (W).	0.783		
- I often stumble upon unexpected opportunities for my business (W).	0.660		
- When I try to solve a particular problem in my business, the solution is often unexpected (M).	0.748		
- When I solve a problem in my business, the solution is often not what I anticipated (M).	0.650		
- I often develop new projects or ideas in ways I could hardly imagine before starting (M).	0.633		

Notes: Survey items marked with an "[R]" have been reversed in the data analysis because they were intentionally phrased oppositely. For the serendipity construct, following Fultz and Hmieleski (2021), items marked with "(W)" pertain to Walpolian serendipity, while those marked with "(M)" pertain to Mertonian serendipity. n = 609

Source: author's own elaboration

An alternative dependent variable was also included: the number of patents registered by each entrepreneur. Patents serve as a tangible and widely adopted indicator of innovation outcomes (e.g., Kim *et al.*, 2019), capturing the preparation and luck necessary for serendipity. Accordingly, patents are typically associated with combinations of inventive activity and preparation (De Rassenfosse *et al.*, 2013). Given the strong link between high-income areas and patenting activity (Benoliel, 2017), the number of patents is used in this study as an alternative measure of the dependent variable within the robustness tests.

The independent variable in this study is subjective well-being, measured, following Newman *et al.* (2018), using five items from the Satisfaction with Life Scale. Subjective well-being is operationalized through overall life satisfaction. The items included: "In most ways, my life is close to my ideal," "The conditions of my life are excellent," "I am satisfied with my life," "So far, I have gotten the important things I want in life," and "If I could live my life over, I would change so many things".

Participants rated these items on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). The reliability of this scale was supported by a Cronbach's alpha of 0.89, indicating high internal consistency. The AVE for the subjective well-being construct was 0.64, signifying good convergent validity. Factor loadings for the items ranged from 0.583 to 0.881, confirming that each item contributed significantly to the construct.

Although this study uses general life satisfaction as an indicator of subjective well-being rather than a work-specific or entrepreneurial scale, this choice is consistent with the logic of SDT, which views well-being as the outcome of need satisfaction extending across life domains. Entrepreneurs' general well-being captures a transferable psychological resource (e.g., energy, cognitive flexibility, and resilience) that can spill over into business-related cognition and behavior. Using a general indicator also ensures comparability across countries.

The study also examined two moderating variables. The intensity of third places (informal public gathering spaces such as restaurants, pubs, and cafés) was measured by asking participants to rate the extent to which their living area has numerous and diverse restaurants, pubs, and cafés (i.e., third places). The scale ranged from 1 (not at all) to 7 (to a great extent). This measure draws on prior studies (Choi *et al.*, 2024; Oldenburg, 1989), which posit that such spaces can foster social interactions. Following previous research (e.g., Zandieh *et al.*, 2016), walking infrastructure intensity was assessed by asking participants to rate the extent to which their living area supports walking and includes pedestrian-friendly infrastructure such as walking paths, using a 7-point Likert scale from 1 (not at all) to 7 (to a great extent).

To control for confounding factors, various control variables were included at both the individual and contextual levels. At the individual level, participants' age was recorded as a continuous variable to capture life-stage and experience effects, which can influence well-being and innovation (Zhao *et al.*, 2021). Full-time engagement in entrepreneurship was also tracked, coded as 1 for full-time and 0 for part-time, as those fully focused on their ventures might benefit more directly from environmental factors due to dedicated time and attention, while part-time entrepreneurs may experience unique stressors from divided commitments. Gender was coded as 1 for female, 2 for male, 3 for other, and 4 for "prefer not to say," allowing control for gender-related differences in entrepreneurial outcomes. Educational attainment was recorded categorically, from "primary school or below" to "doctoral level". Income was self-assessed on a scale from 1 ("well below average in my area") to 5 ("well above average") to reflect economic status, which may influence well-being and innovation propensity. Marital status, coded as 1 for married and 0 for not married, accounted for family support, while the number of children was recorded as a count variable to capture family responsibilities potentially affecting time and stress.

Contextual controls included urban versus rural residence (coded as 1 for urban and 0 for rural) to capture differences in resource access and opportunities. Industry was coded according to the Global Industry Classification Standard (GICS®) to incorporate sector-specific innovation

factors, while country of residence reflected regional economic conditions and institutional support. To account for the influence of urban infrastructure, city population size was included as a continuous variable, representing the scale of economic activity, infrastructure, and available resources. City area (km^2) offered insights into the spatial extent of urban or rural settings, affecting access to resources and proximity to networks. Additionally, population density, calculated as population divided by area, captured the spatial dynamic of population and geography, as denser areas typically provide more amenities and social capital that support entrepreneurial activity. These contextual variables address structural and economic conditions shaping entrepreneurial well-being and opportunity structures.

3.3 Analytical technique

To test the hypotheses, a linear regression analysis was conducted using StataMP 18.0. This method was chosen to examine the relationship between the dependent and independent variables, with the robust option applied to correct for any potential heteroscedasticity in the data. The results are presented in a stepwise manner, beginning with models that include only control variables and progressing to the full model. Given the congeneric estimation of the latent constructs, the dependent variable justified the use of linear regression. This approach rests on the rationale that the dependent variable approximates continuous behavior when the underlying assumptions are met (Fox, 2015). To address potential multicollinearity concerns, all variables were standardized prior to regression analysis (Aiken *et al.*, 1991).

For robustness, alternative models were evaluated using the number of patents (a count variable) in place of the serendipity construct. The generalized linear model (GLM) was employed with a Poisson family and a log link function to analyze the count data for patents. This model specification is appropriate for handling the discrete nature of count data, and the log link function ensures a linear relationship between the predictors and the log of the dependent variable. The results also proved consistent when tested through ordered logistic regression, multinomial logistic regression, and linear regression.

4. Results

4.1 Hypothesis tests

Tab. 3 reports key descriptive statistics. As the correlation table shows, the highest correlations among the main independent variables (i.e., subjective well-being, third places' intensity, and walking infrastructure intensity) include the correlations between subjective well-being and income levels ($r = .423$, $p < .001$), third places' intensity and walking infrastructure intensity ($r = .264$, $p < .001$), subjective well-being and walking infrastructure intensity ($r = .247$, $p < .001$), and subjective well-

being and third places' intensity (r = .216, p < .001). However, no significant multicollinearity issues were detected, as all variance inflation factor (VIF) scores were below the recommended threshold of 10 (Gujarati, 2003). Specifically, the VIFs for the key independent variable and moderators were 1.59, 1.35, and 1.37, respectively. Moreover, the Harman one-factor test indicated minimal potential for common method bias, as the first factor explained only 16.71% of the total variance, which is well below the 50% threshold commonly used to suggest such bias.

Tab. 3: Descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Serendipity	1.000															
(2) Subjective well-being	0.289***	1.000														
(3) Third places' intensity	0.176***	0.216***	1.000													
(4) Walking infrastructure intensity	0.119**	0.247***	0.264***	1.000												
(5) Age	-0.127**	0.004	-0.059	-0.012	1.000											
(6) Full-time (vs part-time) entrepreneur	0.030	-0.051	0.057	-0.013	0.003	1.000										
(7) Gender	0.085*	0.004	0.010	0.037	-0.044	-0.035	1.000									
(8) Educational attainment	0.034	0.135***	0.059	0.062	0.007	-0.055	-0.005	1.000								
(9) Income levels	0.152***	0.423***	0.082*	0.160***	-0.023	0.024	0.043	0.214***	1.000							
(10) Marital status	0.038	0.220***	-0.027	-0.031	0.255***	-0.053	-0.013	0.104*	0.221***	1.000						
(11) Number of children	0.013	0.119**	0.014	0.033	0.369***	-0.032	-0.033	0.003	0.120**	0.389***	1.000					
(12) Urban (vs rural) residence	0.009	0.061	-0.047	-0.098*	0.114**	-0.016	-0.019	-0.061	0.005	0.037	0.015	1.000				
(13) Number of registered patents	0.208***	0.192***	0.053	0.117**	-0.103*	-0.034	0.103*	0.180***	0.190***	0.116**	0.113**	-0.079*	1.000			
(14) Industry	0.022	0.085*	0.024	0.058	-0.121**	0.008	0.036	0.057	0.088*	0.005	-0.023	-0.056	0.098*	1.000		
(15) Country	-0.071+	-0.004	-0.147***	0.055	-0.123**	-0.025	0.053	0.145***	-0.005	-0.033	-0.068*	-0.010	-0.045	0.011	1.000	
(16) City population	0.049	0.044	0.024	0.090*	-0.125**	-0.030	-0.062	0.053	0.104*	-0.033	0.007	-0.189***	0.106**	-0.026	-0.162***	1.000
(17) City area (km²)	-0.001	0.032	-0.054	0.089*	-0.064	-0.097*	-0.019	-0.004	0.071+	0.010	-0.026	-0.104**	-0.004	0.010	0.250***	0.350***

Source: author's own elaboration

Tab. 4 presents the estimated coefficients from the regression analysis for the drivers of serendipity. The results are presented stepwise, beginning with Model 1, which includes only the control variables. In Model 2, all main effects were added, namely subjective well-being, third places' intensity, and walking infrastructure intensity. Models 3 and 4 tested, respectively, the interaction effects between subjective well-being and each of the two moderators on serendipity. Finally, Model 5 presents the full model.

Hypotheses were tested using the full model (Model 5), which incorporated all relevant covariates, controls, and interaction terms. Hypothesis 1 posits that serendipity is positively associated with entrepreneurs' subjective well-being. A positive coefficient for the subjective well-being variable would indicate that higher levels of subjective well-being correspond to greater serendipity. As shown in Model 5, the estimated coefficient for subjective well-being is positive ($\beta = 0.245$, $p < .001$), thus supporting Hypothesis 1.

Hypothesis 2 posits that the relationship between subjective well-being and serendipity is strengthened when there is a high intensity of third places in entrepreneurs' living areas. The coefficient for the interaction term is positive ($\beta = 0.098$, $p < .05$), supporting Hypothesis 2.

Tab. 4: Results of regression analysis

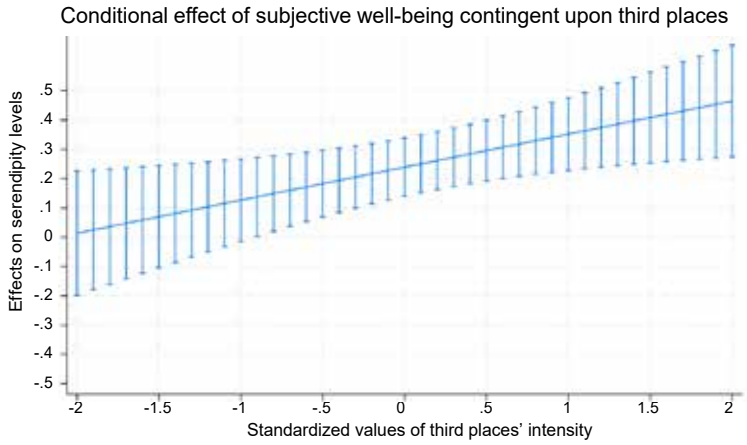
	Hypothesis (H)	Model 1 Serendipity	Model 2 Serendipity	Model 3 Serendipity	Model 4 Serendipity	Model 5 Serendipity
Constant		-0.979*	-0.561	-0.525	-0.540	-0.512
		(0.440)	(0.419)	(0.418)	(0.409)	(0.410)
Subjective well-being	*H1*		0.228***	0.235***	0.240***	0.245***
			(0.052)	(0.051)	(0.052)	(0.051)
Third places' intensity			0.087+	0.101*	0.078+	0.091+
			(0.047)	(0.047)	(0.047)	(0.047)
Walking infrastructure			0.061	0.054	0.082+	0.073
intensity			(0.048)	(0.047)	(0.047)	(0.046)
Subjective well-being X	*H2*			0.113*		0.098*
Third places' intensity				(0.045)		(0.046)
Subjective well-being X	*H3*				0.110*	0.094*
Walking infrastructure					(0.043)	(0.043)
intensity						
Age		-0.173***	-0.151**	-0.152***	-0.155***	-0.155***
		(0.048)	(0.046)	(0.046)	(0.045)	(0.045)
Full-time (vs part-time) entrepreneur		0.098	0.110	0.105	0.121	0.115
		(0.127)	(0.129)	(0.126)	(0.128)	(0.126)
Educational attainment		-0.010	-0.021	-0.032	-0.026	-0.034
		(0.055)	(0.052)	(0.052)	(0.052)	(0.052)
Income levels		0.145**	0.024	0.023	0.037	0.034
		(0.052)	(0.054)	(0.053)	(0.055)	(0.054)
Marital status		0.045	0.022	0.033	0.025	0.034
		(0.100)	(0.098)	(0.098)	(0.097)	(0.097)
Number of children		0.040	0.020	0.015	0.019	0.014
		(0.064)	(0.062)	(0.062)	(0.062)	(0.062)
Gender		Included	Included	Included	Included	Included
Urban (vs rural) residence		0.079	0.062	0.069	0.074	0.078
		(0.099)	(0.096)	(0.096)	(0.094)	(0.094)
Industry		Included	Included	Included	Included	Included
Country		Included	Included	Included	Included	Included
City population X City area (km²)		-0.011	-0.005	-0.009	-0.008	-0.011
		(0.047)	(0.044)	(0.044)	(0.044)	(0.044)
City population		0.037	0.028	0.042	0.037	0.048
		(0.079)	(0.076)	(0.076)	(0.077)	(0.076)
City area (km²)		0.012	0.024	0.011	0.021	0.010
		(0.087)	(0.084)	(0.085)	(0.086)	(0.085)
n		609	609	609	609	609
Adjusted R-squared		0.057	0.121	0.134	0.133	0.142

Notes: Robust standard errors in parentheses; p values are indicated as follows: + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: author's own elaboration

Hypothesis 3 posits that the relationship between subjective well-being and serendipity is strengthened when there is a high intensity of walking infrastructure in entrepreneurs' living areas. The estimated coefficient for the interaction term is positive as predicted ($\beta = 0.094$, $p < .05$), providing support for Hypothesis 3.

Fig. 2: Plot of moderating role of third places' intensity



Source: author's own elaboration

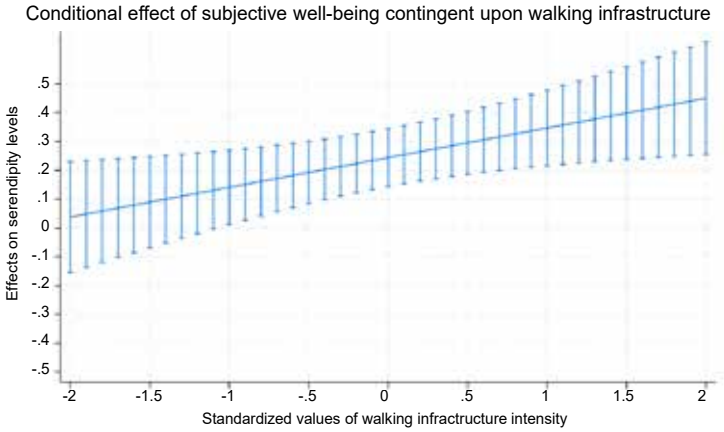
Fig. 2 and Fig. 3 plot the moderation effects. Fig. 2 illustrates the interaction effect between subjective well-being and third places' intensity on serendipity, while Fig. 3 depicts the interaction effect between subjective well-being and walking infrastructure intensity on serendipity. To further inspect the moderations, this paper relied on the Johnson-Neyman technique (Hayes and Matthes, 2009). This approach is useful for identifying the specific points along a continuous moderator where an effect becomes statistically significant. The interaction between subjective well-being and both third places' intensity and walking infrastructure intensity on serendipity was statistically significant, though each moderating factor exhibited unique patterns in strengthening this relationship.

In the single-interaction models (Models 3 and 4, Table 4), the interaction coefficients were $\beta = 0.113$ ($p = 0.012$) for third places and $\beta = 0.110$ ($p = 0.015$) for walking infrastructure. Johnson-Neyman conditional-effects analyses further confirmed these interactions, identifying the specific moderator values at which the effect of subjective well-being on serendipity became statistically significant.

For third places' intensity, the effect of subjective well-being on serendipity became significant once intensity surpassed approximately -1.0. At a third places' intensity of -2, the effect of subjective well-being on serendipity was non-significant ($\beta = 0.014$, 95% CI [-0.199, 0.226]) but became positive and significant at an intensity of 2 ($\beta = 0.465$, 95% CI [0.274, 0.655]). This indicates that higher third places' intensity amplifies the positive relationship between subjective well-being and serendipity. Similarly, for walking infrastructure, the Johnson-Neyman analysis showed

that the positive effect of subjective well-being on serendipity intensified as walking infrastructure increased, becoming statistically significant when intensity surpassed approximately -1.0.

Fig. 3: The moderating role of walking infrastructure intensity



Source: author's own elaboration

At a walking infrastructure intensity of -2, the effect of subjective well-being on serendipity was non-significant (β = 0.038, 95% CI [-0.154, 0.230]), while at an intensity of 2, the effect was positive and significant (β = 0.450, 95% CI [0.255, 0.645]). These findings demonstrate that higher levels of third places and enhanced walking infrastructure both intensify the positive association between subjective well-being and serendipity, each offering complementary pathways for fostering serendipity.

4.2 Robustness tests

To assess the robustness of the results, a number of additional tests were conducted. First, supplementary analyses were performed using the number of patents as an alternative dependent variable. This choice reflects the established role of patents as a measurable outcome of inventive activity and underscores the relationship between serendipity and innovation. This objective measure complements the perceptual measures used in this paper, offering a tangible link to performance outcomes. Patents, as codifications of novel ideas, often originate from unexpected recombinations of knowledge or observations (de Rond, 2014). As de Rond (2014) noted, serendipity entails recognizing meaningful connections between observations, which can catalyze inventive outputs.

According to the collected data, the correlation between serendipity and the number of patents was positive and significant ($r = 0.208$, $p < .001$). Although patents are correlated with serendipity, they may also be contingent on other factors. As illustrated in Tab. 5, the main effect of the independent variable remained positive and significant across all models, providing additional support for Hypothesis 1. Regarding the

two moderators, the hypothesized signs held across all models, as did the significance of Hypothesis 2. For Hypothesis 3, as expected, the sign of the interaction effect remained positive, although the p-value slightly exceeded the threshold of .100.

Second, the full model was re-estimated after removing the control variables to assess the magnitude of the key effects. As shown in Model 10, the removal of control variables did not substantially alter the results, confirming that the observed relationships were not driven by confounding influences or spurious correlations.

Tab. 5: Results of robustness analysis

	Hypothesis (H)	Model 6 Number of patents	Model 7 Number of patents	Model 8 Number of patents	Model 9 Number of patents	Model 10 Serendipity
Constant		-5.003***	-4.972***	-4.906***	-4.914***	-0.051
		(0.926)	(0.892)	(0.940)	(0.895)	(0.040)
Subjective well-being	H1	0.330*	0.343**	0.308*	0.324*	0.282***
		(0.129)	(0.130)	(0.133)	(0.133)	(0.047)
Third places' intensity		-0.124	-0.239*	-0.134	-0.235*	0.116**
		(0.099)	(0.109)	(0.102)	(0.110)	(0.044)
Walking infrastructure		0.211*	0.196+	0.179+	0.175+	0.040
intensity		(0.102)	(0.103)	(0.107)	(0.105)	(0.043)
Subjective well-being X	H2		0.274**		0.254**	0.119**
Third places' intensity			(0.100)		(0.093)	(0.044)
Subjective well-being X	H3			0.156	0.113	0.104**
Walking infrastructure intensity				(0.101)	(0.089)	(0.039)
Age		-0.743***	-0.759***	-0.745***	-0.760***	
		(0.150)	(0.152)	(0.149)	(0.151)	
Full-time (vs part-time) entrepreneur		0.167	0.110	0.185	0.140	
		(0.276)	(0.279)	(0.280)	(0.283)	
Educational attainment		0.525***	0.481***	0.494***	0.463***	
		(0.138)	(0.138)	(0.141)	(0.139)	
Income levels		0.133	0.159	0.177	0.190	
		(0.150)	(0.150)	(0.153)	(0.153)	
Marital status		0.521+	0.508+	0.521*	0.513+	
		(0.267)	(0.268)	(0.266)	(0.265)	
Number of children		0.241+	0.220+	0.228+	0.208	
		(0.131)	(0.130)	(0.128)	(0.127)	
Gender		Included	Included	Included	Included	
Urban (vs rural) residence		-0.298	-0.340	-0.268	-0.314	
		(0.331)	(0.313)	(0.327)	(0.309)	
Industry		Included	Included	Included	Included	
Country		Included	Included	Included	Included	
City population X City area (km^2)		-0.202	-0.215	-0.202	-0.219	
		(0.143)	(0.139)	(0.141)	(0.138)	
City population		0.553*	0.557*	0.544*	0.551*	
		(0.273)	(0.259)	(0.264)	(0.252)	
City area (km^2)		-0.378	-0.405	-0.370	-0.397	
		(0.274)	(0.264)	(0.269)	(0.258)	
n		609	609	609	609	609
Adjusted R-squared						0.123
Log pseudolikelihood		-280.737	-276.301	-279.142	-275.486	-821.216
AIC		1.198	1.187	1.196	1.187	
BIC		-3022.629	-3025.089	-3019.407	-3020.308	

Notes: Robust standard errors in parentheses; p values are indicated as follows: $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: author's own elaboration

Third, Jackknife resampling techniques (Efron and Tibshirani, 1994) were employed. This procedure involved running the regression models

multiple times while systematically excluding individuals from certain countries to detect any undue influence from specific subsets of the data. The consistency of the results obtained through this technique with the initial findings confirmed that the observed relationships were not contingent on particular subsamples of the dataset.

Fourth, the robustness of the latent variable estimates was reassessed. Initially, scores for latent constructs were derived using congeneric approaches. These were then re-estimated using parallel approaches via the CLC Estimator (Marzi *et al.*, 2023). This provided an additional layer of robustness to the analysis, ensuring that the findings were not dependent on specific methodological choices in the estimation of latent constructs.

5. Discussion

5.1 Implications and contributions

This study holds multiple implications. First, by focusing on entrepreneurs' subjective well-being and the characteristics of their surrounding environment, the findings indicate that entrepreneurs with higher subjective well-being tend to exhibit higher levels of serendipity. This contribution advances the literature by providing empirical evidence on the significance of individual-level attributes and environmental factors in promoting serendipity, thereby offering a more holistic perspective on the antecedents of entrepreneurial serendipity (Balzano, 2022; Busch, 2024). Specifically, attention is devoted to the psychological state of the entrepreneur as a central element of entrepreneurial outcomes. This finding suggests that subjective well-being may be viewed as a form of psychological capital, contributing, alongside intellectual, social, and financial capital, to entrepreneurial outcomes.

Second, the study expands upon previous findings that associate well-being with enhanced creativity and innovation (e.g., Stephan, 2018). Prior studies have called for future research that goes beyond traditional performance outcomes of entrepreneurial well-being (Stephan, 2018; Stephan *et al.*, 2023). In response, this study focuses on serendipity as a key outcome variable, bridging entrepreneurial well-being with the emergence of so-called planned luck. This empirically substantiates the idea that positive psychological states produce tangible outcomes. By pointing out the positive impact of subjective well-being on the likelihood of serendipity, the study emphasizes the need for interventions and policies that support the mental and emotional health of entrepreneurs. This contribution highlights the interconnection between personal well-being and professional effectiveness, advocating for a more integrated approach in entrepreneurial support programs.

Third, and in a broader sense, this paper contributes to the literature on entrepreneurship and context. As Autio *et al.* (2014) stated, "the real question, then, seems to be not whether entrepreneurs innovate, but rather, when and where they do so" (p. 1098). Building on this perspective, the findings support the idea that entrepreneurial outcomes may be influenced

by the environments in which entrepreneurs operate, underscoring that innovation and serendipity do not emerge in a vacuum (Pathak, 2021). By integrating subjective well-being with contextual factors such as third places and walking infrastructure, this study provides empirical evidence that environmental affordances amplify how psychological resources translate into entrepreneurial agency and serendipity. In this sense, this finding corroborates the idea that entrepreneurial agency is both contextually and relationally embedded, with the relationship between subjective well-being and serendipity being highly contingent upon the context in which the entrepreneur operates.

In practical terms, the findings offer actionable insights for ecosystem leaders, policymakers, venture-support organizations, and entrepreneurs themselves. For ecosystem leaders and policymakers, the results suggest that serendipity can be supported not only through formal innovation programs but also through everyday spatial and social affordances. Environments rich in third places and walkable infrastructure increase the frequency of informal encounters and unstructured reflection, creating conditions in which exploratory ideas are more likely to surface and evolve into opportunities. This implies urban and regional strategies that prioritize accessible public spaces, mixed-use neighborhoods, and pedestrian-friendly design as part of entrepreneurship-support policies, rather than treating innovation solely as a function of funding or technological infrastructure.

For accelerators, incubators, and entrepreneurial support organizations, the findings suggest that designing programs around dense interaction, informal gatherings, shared social spaces, and opportunities for spontaneous exchange, may enhance opportunity discovery beyond structured mentoring and training activities.

Entrepreneurs themselves should view subjective well-being also as a strategic resource (Ciasullo *et al.*, 2025). Actively cultivating well-being and intentionally embedding themselves in environments that facilitate interaction and reflection may increase exposure to unexpected cues, conversations, and ideas, thereby raising the likelihood of serendipitous discovery.

At the venture level, these findings suggest that serendipity can be partially designed into entrepreneurial routines. Practices such as setting aside time for unstructured exploration, engaging in regular informal exchanges beyond immediate business networks, and creating moments of cognitive detachment from operational tasks may help translate well-being into opportunity recognition. Instead of treating exploration as an accidental by-product of being in business, entrepreneurs and venture teams may benefit from structuring work rhythms that balance focused execution with deliberate opportunities for social interaction and autonomous reflection.

5.2 Limitations and future research avenues

This study is not free of limitations. First, while the study underscores the relevance of being in the right place with the right attitude, it does not

examine whether being there "at the right time" matters (Autio *et al.*, 2014), and, if so, to what extent. Accordingly, the reliance on a cross-sectional design inherently restricts the ability to infer temporal dynamics or establish clear causal relationships. Given the cross-sectional nature of the data, the direction of causality between subjective well-being and serendipity cannot be fully ascertained. It remains plausible that entrepreneurs who experience higher levels of serendipity may subsequently report greater subjective well-being. Future research could address this potential issue of reverse causality by employing longitudinal or experimental designs. Furthermore, unobserved individual traits such as openness to experience, creativity, or cognitive flexibility might simultaneously influence both subjective well-being and serendipity, suggesting the need for models that explicitly account for such omitted variables. Also, although the first hypothesis concerns association rather than prediction in a strict sense, the nature of this study could still give rise to inflated values or causal ambiguity, as data collected at a single point in time may not fully capture the sequence or direction of the observed relationships.

Second, although leveraging primary data sources, the data are self-reported. Entrepreneurs might overestimate their well-being or the frequency of serendipity due to overly positive self-perception or memory inaccuracies. Relatedly, the proposed measures of walkability and third-place density operate at the individual level, allowing for meaningful contextual variation across respondents. In fact, they capture the perceived environmental affordances surrounding each entrepreneur rather than relying on aggregate city averages, thus reflecting differences in accessibility and social infrastructure within the same metropolitan area. Still, future research could employ objective indicators such as GIS-derived walkability scores, business directory data on cafés and social venues, or proximity-based measures from platforms like Walk Score or OpenStreetMap to further validate and triangulate these contextual effects. Moreover, while this study conceptualized third places as informal social venues such as cafés, restaurants, and libraries, future research could extend this framework to professionalized interaction spaces (e.g., co-working hubs, incubators, innovation labs, and networking clubs) that increasingly constitute de facto third places for entrepreneurs. Including such settings would clarify how different forms of social infrastructure generate relatedness and knowledge spillovers within entrepreneurial ecosystems.

Third, this study centers on the factors linked with serendipity, leaving the examination of performance outcomes, namely, the extent to which serendipity translates into realized benefits, beyond its scope, despite the emergence of a positive and significant correlation between serendipity and the number of patents. While this focus provides valuable insights into the conditions fostering serendipity, it also opens opportunities for future research to explore how serendipitous experiences contribute to measurable entrepreneurial outcomes.

Fourth, the sample, although diverse in terms of geography and industry, does not fully represent the global population of entrepreneurs. As cultural differences may affect both the experience of well-being and

the likelihood of serendipity, future research could leverage comparative studies across different cultural contexts to explore these dynamics further.

Fifth, exploring the potential moderating effects of entrepreneurial traits such as openness to experience and resilience on the relationship between well-being and serendipity could offer additional insights. Understanding how these individual differences interact with environmental factors to foster serendipity would be valuable for developing tailored interventions and support mechanisms.

Finally, building on a deductive and quantitative approach, this study employs SDT to theorize the mechanisms linking subjective well-being and serendipity and to formulate the hypotheses tested. SDT, in this sense, serves as a conceptual foundation rather than an object of direct empirical investigation. Future research could qualitatively explore the centrality of the hypothesized mechanisms; specifically, how competence, relatedness, and autonomy dynamically interact to foster serendipitous outcomes in entrepreneurial settings.

6. Conclusion

Why are some entrepreneurs "luckier" than others? The answer proposed by this paper is that subjective well-being provides fertile ground for serendipity in entrepreneurial settings. Additionally, for this positive relationship to fully materialize, entrepreneurs must operate within environments that enable the behavioral expression of their psychological resources. Within such an ecosystem, entrepreneurs with higher subjective well-being can more effectively convert their potential into serendipity in contexts that support their needs for relatedness and autonomy. From this perspective, the results suggest that "third places" such as restaurants, pubs, and cafés meet entrepreneurs' need for relatedness, while an extensive walking infrastructure fosters autonomous thinking, which in turn facilitates the deeper mental processing of their ideas.

Drawing on Louis Pasteur's famous observation that "fortune favors the prepared mind," this paper proposes that, to increase serendipity, entrepreneurs must not only be prepared but also experience a state of well-being and be embedded within a supportive ecosystem. This broader ecosystem plays a critical role in facilitating the "fertilization" of their ideas. Being a high-potential entrepreneur is therefore not only about possessing the right attitude, but also about being in the right place for serendipity to flourish.

On a practical level, this study suggests that entrepreneurs should actively cultivate their well-being, beyond entrepreneurial passion, and at the same time seek environments conducive to increasing serendipity. Specifically, areas with few third places and/or limited walking infrastructure should be mindful that entrepreneurs in such environments may remain but fail to fully realize their potential, which can weaken local innovation capacity and, over time, at scale, contribute to brain drain. Conversely, to mitigate this and simultaneously rejuvenate their regions, ecosystem leaders and policymakers could focus on developing environments that attract and

retain entrepreneurial talent by offering spaces for social interaction as well as infrastructures that facilitate individual reflection and creative thinking.

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Selected Papers

Oh my, AI! How to foster Artificial Intelligence maturity for third-party logistics service providers?[1]

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Lorenzo Bruno Prataviera - Nathan D'souza - Ivan Russo

Abstract

Frame of the research. *Artificial Intelligence (AI) is increasingly seen as a transformative force across the logistics industry, including third-party logistics service providers (3PLs). However, the academic literature reveals a limited understanding of how 3PLs can develop their AI maturity to capture the emerging opportunities.*

Purpose of the paper. *The study explores AI adoption within the 3PL industry by leveraging the dynamic capabilities theory.*

Methodology*. Empirical insights were collected through a single case study at a leading British 3PL, comprising 10 qualitative interviews and 2 on-site visits. Abductive reasoning guided iterative comparisons between empirical material and theory to understand how 3PLs sense and seize AI opportunities and reconfigure their processes during transformation.*

Results*. Sensing AI opportunities depends on developing robust AI awareness and actively involving customers to incorporate their perspective; seizing involves using AI to improve labour forecasting, scheduling, and back-office automation. Companies must also reconfigure resources by fostering a cultural shift and building a robust data infrastructure to support AI efforts. Building on these findings, an exploratory framework is proposed to assess 3PLs' AI maturity level and the related dynamic capabilities.*

Research limitations. *The reliance on a single case study design inherently limits external validity, restricting the applicability of the study's findings to a wider population of logistics and supply chain contexts.*

Managerial implications*. The study focuses on 3PLs to examine how they can navigate the complexities of AI adoption and develop their AI maturity, offering rich empirical insights into the synergies among the human workforce, technological tools, and physical assets.*

Originality of the paper. *Existing research has only recently begun to explore how 3PLs approach AI adoption. The study elaborates and contextualises the dynamic capabilities theory with respect to AI-driven opportunities for 3PLs, showing how sensing, seizing, and reconfiguring capabilities manifest in 3PL operations. By providing original insights into adopting AI tools, it offers a pathway to sense and seize AI-driven capabilities and reconfigure resources through AI adoption.*

Key words*: 3PL; artificial intelligence; AI; dynamic capabilities*

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1. Introduction

Over the last few decades, the increasing focus on core competencies has led many companies to outsource their logistics operations to third-party logistics service providers (3PLs), leveraging 3PLs' expertise to handle transport management, warehousing, and distribution on their behalf (Cozzolino, 2009; Sink and Langley, 1997). Nowadays, the logistics industry is on the brink of a revolutionary transformation driven by advancements in Artificial Intelligence (AI) (Richey *et al.*, 2023; Dang *et al.*, 2025). AI is a branch of computer science that attempts to understand the essence of intelligence and produce a new machine that mimics human intelligence (Bettiol *et al.*, 2021; Jackson *et al.*, 2024). AI is increasingly considered a transformative force within the logistics industry (Helo and Hao, 2022), showing great potential to ease repetitive tasks with minimal human input but also analyse raw data to identify solutions to problems which require significant human input/intervention (Durach and Gutierrez, 2024; Pournader *et al.*, 2021).

Although AI has emerged as a top technological priority for organisations over the last few years, with promising supply chain use cases (Guida *et al.*, 2023; Hendriksen, 2023), the available literature has paid limited attention to its implications for 3PLs (Dang *et al.*, 2025). AI tools can enable 3PLs to improve decision-making, optimise operations, and adapt to increasingly complex and volatile supply chain environments (Richey *et al.*, 2023; Pournader *et al.*, 2021). Recent industry surveys indicate that shippers are likely to switch logistics providers based on AI capabilities, and failing to develop AI readiness could erode competitiveness (NTT Data, 2025). However, many 3PLs struggle to clearly understand the opportunities AI tools may offer (Cannas *et al.*, 2024; Prataviera *et al.*, 2026). Although they risk becoming obsolete or losing competitive advantage if they fail to adopt AI, 3PLs have not yet developed the necessary competencies to reconfigure their operational processes in response to AI innovations, displaying limited AI maturity (Kmiecik, 2023; Jackson *et al.*, 2024). Building on dynamic capabilities theory, which emphasises the importance of an organisation's ability to adapt to changing environments by integrating and reconfiguring resources (Teece *et al.*, 1997), this study aims to address the following research question:

How can 3PLs develop their dynamic capabilities to foster AI maturity?

Building on abductive reasoning, we developed a single case study in collaboration with a leading British 3PL provider, leveraging empirical insights from 10 qualitative interviews with managerial-level stakeholders across different departments and 2 on-site visits. We iteratively compared our empirics with extant theoretical knowledge to elaborate on how 3PLs can leverage their dynamic capabilities to sense and seize AI opportunities, as well as to reconfigure their resources to capture them. Findings highlight that sensing critically depends on AI awareness and understanding, as well as customer involvement, while seizing mainly involves leveraging AI to improve labour forecasting/scheduling and automating back-office

activities. Nevertheless, companies also need to reconfigure their resources through fostering a cultural shift and developing a robust data infrastructure to support AI efforts. Building on these findings, an exploratory framework is proposed to assess 3PLs' AI maturity level and evaluate their dynamic capabilities throughout their AI journey.

The study contextualises the dynamic capabilities theory in relation to AI-driven opportunities for 3PLs, contributing to the literature by illustrating how 3PLs can systematically improve their AI maturity and develop the dynamic capabilities needed to innovate, digitise, and respond to the complexities of modern supply chains. By specifically considering the perspective of 3PLs, this study elucidates how these organisations can sense and seize AI-driven opportunities, reconfigure resources to navigate the complexities of AI adoption, and develop their AI maturity.

The remainder of the paper is organised as follows. Section 2 provides an overview of the relevant academic literature, followed by Section 3, which details our methodological approach. The study's findings are described in Section 4, before discussing their implications in Section 5 and summarising the contribution to knowledge and managerial practice in the concluding remarks.

2. Related literature

2.1 From transport and warehousing to Artificial Intelligence: the evolution of 3PLs

Logistics services are essential in the smooth flow of materials, information, and money within supply chains (Lieb *et al.*, 1993; Cozzolino, 2009). By ensuring an efficient flow of goods and services from point to point, businesses can meet customer demand and create a competitive advantage (Marchet *et al.*, 2017). However, conducting logistics operations efficiently and effectively can be expensive, further diverting businesses' focus from their core competencies and the primary ways they create their competitive advantage (Selviaridis and Norrman, 2015). Therefore, companies increasingly outsource logistics operations to third-party logistics service providers (3PLs), i.e., companies executing logistics operations and adding more value to a shipper's business than the shipper can achieve alone (Marchet *et al.*, 2017). At first, logistics outsourcing was motivated by the need to reduce cost and lead times and avoid heavy investment (Razzaque and Sheng, 1998). It started with services such as transport and warehousing (Sink and Langley, 1997), then evolved into integrating logistics into their client systems and providing tailored solutions to meet specific requirements (Selviaridis and Norrman, 2015). Today, many firms are outsourcing logistics activities to reduce overheads and supply chain complexity, increase capacity, and retain the benefits of operational efficiency, flexibility, and higher customer satisfaction (Prataviera *et al.*, 2021).

Although 3PLs emerged as essential players in streamlining supply chain operations, the rising digitalisation has significantly affected their

business and opened up significant opportunities to add value to client services (Mathauer and Hofmann, 2019). Digitalisation refers to the process by which companies collect, store, analyse, and use customer and market data to capture value through digital technologies (Zhou *et al.*, 2023). As we venture deeper into the digital age, the emergence of large language models like ChatGPT suggests we are on the brink of a significant technological upheaval driven by AI, which can potentially revolutionise logistics and supply chain management (Richey *et al.*, 2023; Dang *et al.*, 2025). AI refers to the ability of a machine to reason, solve problems, and adapt to its environment (Bettiol *et al.*, 2021; Chen and Chen, 2022), simulating and performing tasks that typically require human intelligence, such as logical reasoning, learning, and problem-solving (Iansiti and Lakhani, 2020; Patrizi *et al.*, 2021). In the supply chain context, AI tools can process vast amounts of data generated across supply chains to provide actionable insights, helping managers make informed decisions regarding procurement, manufacturing, and distribution (Hendriksen, 2023; Cannas *et al.*, 2024).

2.2 AI tools: Predictive analytics, generative AI, and AI-driven automation

AI tools can be classified into different types based on their cognitive ability, i.e., their capacity to learn, understand, and make decisions based on data and experiences. This classification discloses three overarching types of AI tools: predictive analytics, generative AI, and AI-driven automation.

Predictive analytics tools help predict future activities (Mediavilla *et al.*, 2022). AI predictive analytics models enable more accurate demand forecasting, optimise inventory, reduce stockouts, and provide predictive maintenance of equipment, helping reduce downtime (Woschank *et al.*, 2020). They often rely on machine learning algorithms to analyse historical data and trends to predict future demand, helping companies better prepare for demand and supply fluctuations (Richey *et al.*, 2023). Such algorithms can help optimise transport routes and schedules, reduce fuel consumption, and improve delivery times (Jackson *et al.*, 2024).

Generative AI tools enable content generation with limited predictive capabilities, focusing on original content rather than acting on existing elements (Hendriksen, 2023). Natural language processing models can handle customer inquiries and resolve issues autonomously through chatbots powered by generative AI (Durach and Gutierrez, 2024). Chatbots can enhance operational efficiency by automating routine tasks, providing real-time updates and assisting in decision-making processes (Pfaff, 2023). Generative AI opportunities also relate to conversational interface and knowledge discovery, supporting organisational and administrative tasks (Durth *et al.*, 2023).

Lastly, AI-driven automation involves using AI to automate various logistics processes (Richey *et al.*, 2023). Logistics automation usually entails adopting physical robots, such as Automated Guided Vehicles (AGVs) and Autonomous Mobile Robots (AMRs) (Benzidia *et al.*, 2019). AGVs and AMRs are self-guided vehicles equipped with sensors and cameras that provide efficient material transport within logistics facilities. They can

navigate throughout the warehouse, retrieve products from their locations, and deliver them to the picking stations, thereby improving picking efficiency. AI can reinforce logistics automation and improve warehousing operations, reducing errors and increasing throughput by enhancing precision and adaptability. Given the rising shortage of qualified supply chain personnel, including people working in transport and warehousing operations (Klumpp, 2017; Phares and Baltrop, 2022), AI could help solve labour shortages. However, the broader impact of AI on labour demand is under discussion as it might lead to job displacement (Chen *et al.*, 2020).

Overall, logistics research highlights specific applications that enable end-to-end supply chain visibility, warehouse optimisation, predictive maintenance and last-mile routing (Pournader *et al.*, 2021). The discussed examples underscore the breadth of AI's impact across planning and operational optimisation (Hendriksen, 2023). Nevertheless, barriers to AI adoption in logistics include difficulties in integrating new AI solutions with legacy systems, a shortage of personnel with the necessary digital skills, and high initial investment costs (NTT Data, 2025). Addressing these hurdles requires attention to data quality and governance as well as organisational change management (Durach and Gutierrez, 2024).

2.3 Dynamic Capabilities Theory and AI development in logistics

Dynamic capabilities are the firm's ability to integrate, build, and reconfigure internal competencies to address changes in the business environment (Teece *et al.*, 1997). For analytical purposes, dynamic capabilities can be disaggregated into the capacity to sense and shape opportunities and threats, to seize opportunities, and to reconfigure the business enterprise's intangible and tangible assets to maintain competitiveness (Teece, 2007).

In the logistics industry, this theory is increasingly used to explain and predict how firms respond to rapid technological advancements and evolving customer demands (Li *et al.*, 2024; Ciceri *et al.*, 2026). AI is emerging as a driving force of digital transformation, offering 3PLs significant potential to enhance their business operations by improving decision-making and automating processes (Richey *et al.*, 2023). However, the strategic integration of AI into logistics operations requires the development of specific capabilities and competencies (Jackson *et al.*, 2024). Sensing in the AI context involves identifying how AI tools can unlock new opportunities, while seizing requires embedding these technologies into business operations. Reconfiguring, then, involves restructuring internal processes and systems to fully leverage AI's potential (Prataviera *et al.*, 2026).

Previous scholars argue that companies can start by identifying potential business use cases or opportunities where AI might generate improvements (Hendriksen, 2023; Herremans, 2021), then focus on the planning stage, highlighting critical steps such as accessing available data sources and identifying their use within the company (Wagner, 2020). However, implementing AI requires not only the right technology but also consideration for the people working alongside it. The continuous

advancement in computing power and data availability has facilitated the maturation of AI, enabling efficient and robust human-AI collaboration (Jackson *et al.*, 2024). Human-AI collaboration depends on several critical factors, including the flexible integration of AI into workflows, support for human sensemaking, and the maintenance of human control over AI systems (Hendriksen, 2023). Organisations must equip their workforce with the necessary skills to leverage AI tools effectively, though this is not a one-off training exercise but rather a cultural shift towards continuous learning and upskilling (Jaiswal *et al.*, 2022; Shrestha *et al.*, 2019). Overall, companies need to understand the implications of AI integration in operational settings, as well as the importance of data management and organisational culture in driving AI maturity (Dhamija and Bag, 2020). Previous scholars formalised AI maturity as the level of development and sophistication in an organisation's utilisation of AI tools and capabilities (Chen *et al.*, 2021). Companies usually utilise maturity models to assess the capabilities of technologies and improve their ability to apply them, considering dimensions such as culture/mindset, data maturity, ethics, organisation and processes, and technological development (Comuzzi and Patel, 2016; Sonntag *et al.*, 2024).

3. Methodology

3.1 Research design

This study aims to explore how 3PLs can build their AI maturity. The dynamic capabilities theory is leveraged as it examines the foundation of enterprise-level competitive advantage in regimes of rapid (technological) change (Teece, 2007). As 3PLs experience the tumultuous evolution of the AI types around them, their ability to sense, seize, and reconfigure their internal processes becomes crucial for harnessing AI. Given the study's exploratory nature and the need to capture in-depth insights, a qualitative case study approach is employed to cope with contemporary practices and challenges (Ketokivi and Choi, 2014). As units of analysis, we considered AI-related capabilities supporting AI adoption within 3PLs.

A single-case study research design was adopted to conduct exploratory research focused on better understanding a nascent phenomenon, examining a specific setting to gather rich and detailed data, and generating deep insights into the phenomenon (Voss *et al.*, 2002). Although a single-case approach can reduce transferability, it allows for the investigation of an unexplored phenomenon (Flyvbjerg, 2006), as demonstrated by the scarcity of empirical studies that delve into the real-world implementation of AI by supply chain managers and enterprises (Moretto *et al.*, 2024). A leading British 3PL provider was considered a rare example of an organisation actively involved in developing and implementing AI solutions, as shown by the creation of a structured open innovation programme, including an Innovation Centre to trial AI solutions (e.g., transport route optimisation and warehouse automation software). The selected 3PL can be considered a critical or revelatory case because it is among the first providers to

experiment extensively with AI initiatives, offering insights that could illuminate broader industry dynamics, despite the inherent limitations of a single-case design. The case offered unique potential to explore AI adoption within 3PLs' logistics processes (Flyvbjerg, 2006), enabling us to examine the current business landscape and identify ways to create opportunities for customer value enhancement. Despite its initial commitment to AI, the company is still at the beginning of its AI journey, revealing unique opportunities to examine how to further develop AI-related capabilities.

The research approach is based on abductive reasoning (Kovacs and Spens, 2005). Abductive reasoning focuses on the search for suitable theories for an empirical observation through "theory matching" or "systematic combining" (Dubois and Gadde, 2002). By leveraging abductive reasoning, this research bridged empirical findings with previous knowledge and the dynamic capabilities theory. The abductive research process began by reviewing available academic literature to develop a broader understanding of AI's strategic opportunities and adoption within the 3PL industry (Kovács and Spens, 2005). Supply chain magazines and other secondary sources were also analysed to contextualise the academic insights through a practitioner lens, strengthening the study's practical relevance. Next, in-depth empirical insights were collected, analysed, and systematically combined with the existing literature, specifically in relation to the dynamic capabilities theory.

3.2 Data collection

Data were collected through semi-structured interviews with 10 senior managerial stakeholders and 2 on-site visits at one of the company's primary distribution centres. Informants were selected based on their potential to provide details about the investigated unit of analysis. In more detail, interviewees included all senior stakeholders who would be decision-makers or influencers in AI adoption, namely two Executive Board Members, five members of the Senior Leadership Group, and three Heads of Department. Semi-structured interviews were conducted between April 2024 and June 2024 (either in person or online through Microsoft Teams). On-site visits in May and July 2024 provided contextual understanding and first-hand insights into the company's technological landscape and operational processes. Each interview lasted 45 to 60 minutes. Interviewees were provided with consent forms before the interview and were assured that their information would be confidential and anonymous (Voss *et al.*, 2002). Each participant was asked to sign the consent form, and the forms were stored in a secure location. All the interviews were recorded and transcribed verbatim to ensure accuracy, and backup files of each transcript were maintained to safeguard against accidental deletions within the main files. Transcripts were condensed and returned to our interviewees for fact-checking and accuracy verification. All the interviewees were consistently available to answer questions or provide additional contextual information needed for our analysis. Primary data collected through semi-structured interviews were triangulated with academic and grey literature, including reports from Gartner and other global firms, which provided

additional insights into the current state of AI applications in logistics and supply chain management. In addition to interviews, the research includes observations from two visits to the Innovation Centre and the primary distribution centre. These visits offered on-field insights into the technologies used in warehousing and transport operations, allowing firsthand observation of the impact of AI adoption on both front-end (e.g., goods receiving, picking, packing, labelling) and back-end activities. Those observations represented a source of original disciplinary knowledge that is fruitful for exploring technological innovations and the implementation of advanced technologies, such as AI. Notes from the visit were taken down manually or recorded and later transcribed to capture details of the various stimuli; some photographs were taken of in-development technologies to document the near future of technological advancement. Lastly, the study's findings and implications were returned to interviewees for fact-checking and accuracy verification.

3.3 Data analysis

Data analysis included familiarising and preparing the data, generating initial codes, searching for themes, and reviewing/defining them (Braun and Clarke, 2006). To clean the data collected from the semi-structured interviews and site visits, each transcript was read thoroughly, followed by familiarisation with the data to take notes and record early impressions from each interview (Voss *et al.*, 2002). Data analysis followed the approach suggested by Gioia *et al.* (2013) to move from 1st order concepts (centred on the informants' perspectives) to 2nd order themes and then aggregate dimensions. In practice, we progressed from empirically driven codes (1st order concepts) to more conceptual categories (2nd order themes) which were then further abstracted to overarching themes (aggregate dimensions) explicitly linked to the extant theory and its core capabilities (sensing, seizing, reconfiguring), enabling an iterative process where empirics and theory inform each other (Kovács and Spens, 2005).

In more detail, the process began by examining the interview transcripts to identify key phrases, codes, and ideas related to AI adoption and the emerging opportunities. Consistent with our abductive reasoning, 1st order concepts were inductively derived from interviewees' perceptions and insights. Based on the semi-structured interviews and on-site visits, this initial set of codes was developed from interview quotes. 1st order concepts reflected the interviewees' experiences and perspectives and were then compared for pattern matching, being grouped into broader 2nd order themes. The level of detail within the transcripts helped organise data into more conceptual categories. For example, a 2nd order theme named "AI Awareness" emerged from 1st order concepts such as "Acknowledging AI beyond general hype" and "Understanding AI's limitations and challenges". As another example, observations about AI testing at the Innovation Centre were grouped into the 2nd order theme of "Experimenting with AI usage", while 1st order concepts concerning specific AI tools led to the formalisation of the 2nd order theme "Embedding different AI types". 2nd order themes were further consolidated into overarching

aggregate dimensions to capture the essence of the company's dynamic capabilities towards AI adoption. For example, "3PL Dynamics" emerged as an important 2nd order theme, reflecting the 3PLs' specific business environment and the importance of liaising effectively with customers. Careful consideration was given to which aggregate dimension best fit the 2nd order theme, and "Sensing" was selected because it most accurately reflects how customers influence AI decisions, as customer dynamics significantly shape the identification of new business opportunities for 3PLs. Overall, three aggregate dimensions were formalised in accordance with the established literature about dynamic capabilities (e.g., Teece *et al.*, 1997) for theory matching (Dubois and Gadde, 2002).

Moreover, during data analysis, additional insights emerged regarding the interdependencies among dynamic capabilities arising from AI adoption. We identified 1st order concepts describing how scanning AI opportunities is a precondition for exploitation, or how initial tests reveal the need for deeper transformations. Customer involvement primarily relates to sensing, but it also influences implementation choices and affects seizing through prioritisation. Similarly, data infrastructure development concerns reconfiguring capabilities, yet it also unfolds as an enabler for sensing and seizing. Since the three dynamic capabilities emerge as analytically distinct but empirically intertwined, we combined our empirical data and their analysis with recent academic literature about AI capabilities in logistics and supply chain management (Richey *et al.*, 2023; Jackson *et al.*, 2024) and drew on knowledge from closely related research domains focusing on AI maturity (e.g., Sonntag *et al.*, 2024), which refers to the level of development and sophistication in an organisation's utilisation of AI tools and capabilities (Chen *et al.*, 2021). This approach stimulated fruitful cross-fertilisation, in which new combinations for AI development and maturity levels were developed through a blend of established theoretical models and concepts derived from confronting reality (Dubois and Gadde, 2002). We challenged our findings and compared the emerging patterns about AI adoption against the available literature, developing an exploratory framework to assess AI maturity and 3PLs' related dynamic capabilities with respect to organisational processes, culture and competence, data maturity, and technological adoption (Comuzzi and Patel, 2016; Sonntag *et al.*, 2024).

4. Findings

4.1 Sensing

The importance of AI innovation is driven by the strong commitment at the Executive Board level, as noted by the Product Director - Technology: "*AI is a buzzword, our board's talking about it, our executive board is talking about it*". With this commitment at the executive level, the company set out to understand and explore AI potential by creating an Innovation team, which led discussions on AI awareness and understanding by focusing on defining what AI capabilities meant to the 3PL business. The company

created an Innovation Centre to host events where business use cases are presented, also inviting startups to propose their solutions. In 2023, the Innovation Centre explored services from AI startups across four clear use cases: labour forecasting, labour scheduling, last-mile delivery vehicle selection, and network optimisation. As explained by the Head of Innovation: "*there were big use cases, and we invited around ten big and small companies to pitch. This was for us to explore and not invest money into something built from scratch*". Therefore, the company was able to embark on an AI learning phase. Moreover, the company encourages home-grown talent through its AI solution enabler programme. This internal initiative asks employees to showcase their innovative ideas to help solve selected use cases.

However, interviews also revealed the critical importance of the business dynamics between 3PLs and their customers. The company owns only about 40% of its truck fleet and an even smaller share of its distribution warehouses, relying heavily on its customers' behaviour. Interviews revealed how deeply customers are integrated into the company's business, including their influence on AI adoption, and multiple stakeholders highlighted that customer interest is a critical driver in AI exploration. However, there is a gap between customer expectations and their understanding of AI applications. As reported by the Chief Innovation Officer, "*our customers want us to use AI but don't know what they want us to do with it*". Therefore, major customers talk with senior executives to inform them about the latest AI tools they may be implementing. This also involves customers contributing to the Innovation Centre's selection criteria for testing specific technologies.

4.2 Seizing

Any technological innovation, including AI developments, needs alignment with the broader business strategy. The first step is to identify use cases. Based on the identified use cases, business cases are developed, as initiatives require a strong return on investment (ROI). Regarding predictive analytics, the company developed business use cases to justify investments in AI initiatives or tools that may alleviate business challenges and improve predictive capabilities. For example, a top challenge in the 3PL industry is a labour shortage. Accordingly, one of the most pressing opportunities concerns labour scheduling, which is crucial for workforce optimisation to better cater to customer needs and address shift inefficiencies. Delivery and inventory management are also crucial to enhance delivery and stock accuracy. The company is currently analysing how machine learning algorithms could feed their daily delivery schedule and optimise delivery routes, saving fuel and ensuring on-time deliveries for both primary distribution and last-mile delivery.

Regarding Generative AI, the company recently arranged licences for 30 Microsoft Copilot users to test its use across different departments. It assists workers in generating text, suggesting edits, analysing/searching for data and documents, creating presentations, and managing emails. Findings showed a wide range of responses, with specific departments

benefiting substantially from Copilot while others remain unaware of its potential or have not yet identified a personal use case. This reflects the company's approach to "finding the right hands" for the limited number of licences it has. Beyond Copilot, the company is testing a chatbot assistant that helps generate meeting ideas, including strategies, standard operating procedures, and creative content. Moreover, the company is exploring Generative AI tools for recruitment, as their algorithms handle skill assessments and provide candidates with real-time warehouse scenarios to assess their job-readiness. Furthermore, the company considered an AI-enabled contract review tool for the procurement team. However, its limited scope and high licensing cost didn't justify the company-wide investment.

Lastly, the company has invested heavily in robotics for automation. While older distribution centres use non-AI robotics, newer facilities employ advanced AMRs for efficient, adaptable routing with minimal human intervention. In this respect, the Head of Robotics Solutions explained, "*we currently have more QR-based AMRs, but we're exploring collaborative mobile robots for greater flexibility and impact without zonal restrictions*". AMRs can map the area autonomously or be guided by a handler using an RFID-based wearable. Then, AI software optimises the robot's route through machine learning algorithms to reach the pickers efficiently. However, investment in proprietary AI software to strengthen robotics is highly critical as AI offers significant opportunities for better optimisation and synchronisation. Nevertheless, AI-driven automation is not limited to physical operations but also extends to back-office activities. The company already leverages AI to improve the quality of activities such as employee or subcontractor work allocation, payment processing, and invoice matching.

4.3 Reconfiguring

Developing AI capabilities and integrating them into the 3PL business presents its own set of challenges. One primary concern is integration, particularly given multiple contracts and different legacy systems. Backed by executive-level commitment, an open and inclusive culture towards AI is highly encouraged. One key aspect is the eagerness to change, supported by the Leadership buy-in. As emphasised by the Operational Excellence Director, "*there's real fear around technology. But motivation and investment from the higher up have encouraged a positive direction to overcome this fear*". Skill development and continued learning are crucial aspects of the company's cultural approach, along with cross-functional exposure and the creation of mutual trust across different organisational levels. Moreover, due to numerous ethical concerns related to AI adoption, an Assurance, Quality, Service, Cost, and Innovation (AQSCI) checklist was developed for internal use and to assess external AI suppliers. These ethical considerations are critical to ensure that vendors offering AI solutions have appropriate ethical policies.

Nevertheless, data readiness is critical, and high-quality centralised data is crucial for AI implementation. Interviews revealed the company's strong

focus on data availability and accessibility. Many interviewees stressed the importance of data integrity, highlighting the need for a consistent and robust data infrastructure. Without it, AI (as well as other technologies) would have a limited impact. Currently, the urgency of centralising data to foster AI is strongly felt across the organisation, and efforts to centralise data are led by the executive level. To ensure data quality and integrity as AI adoption ramps up, the company holds a weekly data quality forum to iron out data issues. To maintain data security, data is provided to internal stakeholders and vendors on a role-based basis. However, as the importance of data to AI grows, stakeholders recognise the challenges posed by decentralised operations. As acknowledged by the Strategy Manager, "*we've got lots of data across the business that sits isolated. Our best use case is convergence - combining these datasets to extract value from a holistic view*".

5. Discussion

The dynamic capabilities theory suggests that companies need to develop the ability to integrate, build, and reconfigure competencies and resources to create, deploy, and protect the intangible assets that support superior long-run business performance (Teece, 2007). The theory also emphasises the importance of adapting to changing environments (Teece *et al.*, 1997). Today, AI represents a powerful driver of transformation within the logistics industry (Durach and Gutierrez, 2024; Richey *et al.*, 2023). However, the existing literature offers limited insights into how 3PLs can understand and leverage AI's potential across their operations (Jackson *et al.*, 2024; Prataviera *et al.*, 2026). Our findings suggest that enhanced sensing of AI-driven opportunities is driven by increasing awareness and commitment at the executive level, which sets strategic goals to extract the maximum value from AI initiatives by building customer trust. The commitment to a customer-centric approach seems crucial, as customer involvement helps guide technological choices and strengthens customer relationships, potentially leading to extended contracts and helping customers understand solutions they may not be aware of.

Sensing AI opportunities directly influences the ability to seize opportunities across different types of AI tools (i.e., predictive analytics, generative AI, and AI-driven automation). Executive decisions inform the creation of a business use case, which is usually driven by customers' needs, such as improving inefficient labour scheduling, thereby identifying strategic opportunities for 3PLs. Our findings suggest that adopting an off-the-shelf "buy" procurement strategy for AI is currently more suitable than internal development, helping reduce costs and avoid the massive internal effort required to develop these solutions. After identifying strategic opportunities, 3PLs can shortlist and evaluate external suppliers offering AI tools, prioritising those that can provide proprietary software enabling effective integration with 3PLs' existing systems. Operationally, the case findings illustrate the vast potential of predictive analytics to address labour shortages and enhance operational efficiency, in line with previous

scholars (e.g., Richey *et al.*, 2023; Mediavilla *et al.*, 2022). Generative AI can be leveraged to enhance knowledge sharing and content creation (Durach and Gutierrez, 2024), while robotics reflects the growing importance of AI-driven automation. Beyond robotics, the findings also illustrate the potential for AI to automate tasks such as number matching and data entry in back-office operations, reducing errors and improving efficiency.

However, our analysis also highlights two critical areas for reconfiguration that underpin AI capabilities. First, AI's impact on labour prompts debate and potentially creates significant frictions due to job displacement and elimination (Chen *et al.*, 2020; Klumpp, 2017). Therefore, an open and inclusive culture is required to enable a cultural shift towards AI adoption. It becomes critical to engage with workers to discuss how technological adoption does not encompass work-replacing consequences for humans. Instead of being a threat to people, AI becomes a contributor to enhanced job satisfaction, addressing labour shortages without reducing employment opportunities. Moreover, prioritising the completion of a centralised data infrastructure and establishing clear data governance policies are fundamental steps, as high-quality, well-managed data is critical (Zhou *et al.*, 2023).

Moreover, our findings illustrate that dynamic capabilities are analytically distinct but empirically intertwined. Our analysis illustrates that sensing involves understanding how AI tools can unlock new opportunities, while seizing requires embedding those tools into business operations. Reconfiguring, then, involves restructuring internal processes and systems to fully leverage AI's potential. However, it also suggests that sensing capability enables seizing capability, and the latter fosters resource reconfiguring. Scanning opportunities is a precondition for exploitation, while identifying and prioritising use cases leads to better engagement with AI, and initial successes motivate deeper engagement with technologies. Experimenting with AI (i.e., seizing) helps reveal the need for broader transformations and requires resource reconfiguration. Developing a robust data infrastructure improves data quality, indicating a high potential to strengthen sensing capabilities and accelerate AI adoption.

5.1 Depicting an Exploratory Framework for 3PLs' AI Maturity

Based on insights from qualitative interviews and the literature review, an original exploratory framework to display and assess 3PLs' AI maturity and the related dynamic capabilities is presented in Figure 1. 3PLs' success depends not only on technological readiness but also on relational, organisational, and cognitive factors (Dang *et al.*, 2025). We thus combined our empirical work and prior conceptual work to envision future patterns of AI adoption by 3PLs, proposing five maturity levels of dynamic capabilities driven by AI adoption that merge empirical findings with established concepts from the extant literature on AI maturity (Comuzzi and Patel, 2026; Sonntag *et al.*, 2024). At the first level, termed the Initial Explorer (L1), 3PLs begin investigating AI opportunities without formal AI processes and with limited awareness. At this level, they can sense new opportunities through scanning, learning, and interpreting activities. 3PLs can host AI pilots as

they progress to Focused Pilot (L2), thereby increasing their AI awareness while evaluating solutions from external AI suppliers. This corresponds to the preliminary seizing of AI opportunities: once a new (technological or market) opportunity is sensed, it must be addressed through new products, processes, or services (Teece, 2018). The journey continues to become a Structured Implementer (L3), encompassing widespread AI awareness across organisational departments and the implementation of AI tools across different business areas. At this level, reconfiguring capabilities are developed to incorporate the successful identification and calibration of technological and market opportunities, the judicious selection of technologies and product attributes, the design of business models, and the commitment of financial resources to investment opportunities. This is reflected in the case by the company's ongoing efforts to centralise data and build a centre of excellence, which emerges as critical for future AI success. Advanced Integrator (L4) follows, marked by AI being deeply integrated into multiple business areas, deployment across various applications, and the emergence of an AI-driven culture with solid vendor relationships. This level corresponds to mature sensing and seizing capabilities, while the highest level of overall maturity is a Transformed Organisation (L5), where employees lead AI-based innovation. In this scenario, the 3PL becomes an AI industry leader with robust reconfiguration capabilities that embrace a deep cultural shift. Accordingly, the distinction between L4 and L5 lies in how AI reshapes the organisational culture and identity, rather than in technological advancements (Jaiswal *et al.*, 2022).

Fig. 1: Exploratory framework to assess 3PLs' AI maturity level and the related dynamic capabilities

Level	Organisational Processes	Culture and Competence	Data Maturity	Technological Adoption	Dynamic Capabilities Maturity
Initial Explorer (L1)	No formal AI processes, mostly exploratory scoping through programs	Limited AI awareness, primarily at the managerial level	Unstructured data across multiple systems or business units	Limited AI technology deployment such as in robotics and automation	Sensing ●○○ Seizing ○○○ Reconfiguring ○○○
Focused Piloter (L2)	Pilot projects underway through programs, evaluation of vender performance	Increased AI awareness of applications; some departments using AI tools (e.g., Copilot)	Ongoing data centralisation efforts and investments in data quality checks	Implementation of off- the-shelf AI solutions and investment in robotics	Sensing ●○○ Seizing ●○○ Reconfiguring ●○○
Structured Implementer (L3)	Focus on procuring through established procurement norms and scalability of AI vendors	Widespread AI awareness, regular cross-functional exposure to AI initiatives	Standardised data model, defined norms for data quality checks and ownership	Facilitation of AI systems across multiple business functions; widespread use of generative AI	Sensing ●●○ Seizing ●○○ Reconfiguring ●○○
Advanced Integrator (L4)	Strong vendor relationships, built through trust in technology	Continuous AI learning programs for employees	Fully centralised data infrastructure (e.g., data centres) allowing advanced analytics	Widespread deployment of AI solutions across predictive, generative and automation applications	Sensing ●●● Seizing ●●○ Reconfiguring ●●○
Transformed Organisation (L5)	Fully integrated information for sharing AI processes between 3PLs, allowing for continuous optimisation	Al-driven culture, employees driving AI- based innovation or Al-first mindset	Real-time data-driven decision-making, altowing for industry-Leading AI initiatives	Industry leaders in introducing built-from- scratch AI technologies, including advanced robotics and cognitive technologies	Sensing ●●● Seizing ●●● Reconfiguring ●●●

Source: our elaboration (Note: black circles in the column "Dynamic Capabilities Maturity" indicate increasing maturity levels)

6. Concluding remarks

3PLs find themselves amid an industry-wide digital transformation driven by the adoption of AI tools, which can improve process efficiency and extract valuable insights from data, adding tremendous value to their customers. This study leveraged the dynamic capabilities theory to explore how 3PLs can develop the sensing, seizing, and reconfiguring capabilities needed to innovate and respond to the complexities of modern supply chains. A single case study conducted within a leading British 3PL offered rich insights into how leveraging AI potential is a crucial capability for 3PLs. Moreover, an exploratory framework is proposed to assess 3PLs' AI maturity and their related dynamic capabilities, merging empirical findings with the extant literature on AI maturity. Therefore, the study sketches a pathway for AI adoption by 3PLs, offering rich empirical insights into the synergies among the human workforce, technological tools, and physical assets.

6.1 Theoretical implications

From an academic viewpoint, the study contextualises the dynamic capabilities theory within the realm of AI adoption in logistics. Accordingly, it can offer two theoretical contributions. By showing how sensing, seizing and reconfiguring capabilities manifest in 3PL operations, the study suggests that developing AI maturity in 3PLs requires more than deploying technology. Findings highlight that AI maturity is built through cultivating sensing, seizing and reconfiguring capabilities across customer engagement, predictive applications, and organisational transformation. Moreover, the study emphasises the pivotal role of customer involvement in sensing AI opportunities-an aspect often underemphasised in the dynamic capabilities literature. Second, the study provides original insights into adopting AI tools, offering a pathway to sense and seize AI-driven capabilities and reconfigure resources to address technological changes. To this end, it proposes an exploratory framework for 3PLs' AI maturity that integrates capability development with organisational and cultural readiness. The framework merges categories taken from the extant literature on AI maturity with contextual insights, building on recent work (e.g., Jackson *et al.*, 2024; Prataviera *et al.*, 2026) to suggest that 3PLs' AI-related challenges could be framed within organisational processes, culture and competence, data maturity, and technological adoption. Due to its limited empirical foundations, this framework also offers promising opportunities for further testing and refinement. At the same time, dynamic capabilities theory privileges internal resource orchestration and may underplay structural or power-related constraints. Therefore, alternative perspectives such as the resource-based view or information processing theory could complement the analysis offered in this study.

6.2 Managerial implications

For managers, the study exposes how 3PLs can navigate the complexities of AI adoption and develop their AI maturity. To sense AI opportunities

effectively, 3PLs should cultivate organisation-wide awareness of AI technologies and co-create solutions with customers, recognising that customer expectations shape which opportunities will generate value. Since the most promising early gains from AI adoption lie in predictive labour scheduling and automation of administrative tasks, managers can seize such opportunities by piloting these applications and measuring their impact to build momentum and learn before scaling. Nevertheless, successful AI adoption requires reconfiguration beyond technology, including fostering a culture that embraces experimentation and investing in data infrastructure and governance to enable AI solutions. To this end, the exploratory framework proposed here serves as a diagnostic tool for scholars and practitioners to assess readiness and identify avenues for improvement. Findings suggest that 3PLs should cultivate strategic partnerships with AI vendors to maximise learning opportunities and increase operational effectiveness, with particular interest in labour forecasting and scheduling. Given the typical fragmented business structure of customer contracts in the 3PL industry, fostering an AI-positive culture from the top down is crucial, with leadership championing this change and encouraging implementation and testing at all levels. Similarly, prioritising the completion of a centralised data infrastructure and establishing clear data governance policies are fundamental steps for successful AI adoption.

7. Research limitations and future research directions

The reliance on a single case study design inherently limits external validity, restricting the applicability of the study's findings to a wider population of logistics and supply chain contexts. However, our analytical approach followed rigorous procedures to strengthen internal and construct validity, including selecting respondents based on their potential to provide details about the investigated unit of analysis and returning all collected data to respondents for fact-checking and accuracy verification. Future work could investigate other contexts (e.g., involving 3PLs outside the UK) and elaborate single case findings to explore the transition across the different levels of the proposed exploratory framework for AI maturity and examine how it manifests in alternative settings.

Moreover, specific findings may quickly become outdated due to the rapid pace of technological evolution in the field. However, this limitation highlights an opportunity for future research, including periodic assessments of dynamic AI capabilities and their readiness for various logistics applications (Durach and Gutierrez, 2024). Lastly, the study did not consider different AI types simultaneously, while future research could investigate the synergies and novel applications arising from such combinations within the context of 3PL businesses. Such investigations could also help illuminate the interdependencies characterising the relationships among the different dynamic capabilities.

Data availability statement

Due to the sensitive nature of the research, supporting data is not publicly

available. However, data that support the findings of this study are available from the corresponding author upon reasonable request.

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Resilience in flux: how family firms challenge liquid modernity[1]

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Abstract

Framework of the research. *In an era of liquid modernity-characterized by uncertainty, acceleration, and fragmentation-family businesses must redefine resilience to effectively address evolving challenges. Although resilience has been extensively studied, few works explore its transformation under the pressures of liquid modernity.*

Purpose of the paper. *This study examines how family firms reinterpret resilience by balancing continuity with the embrace of change.*

Methodology. *A qualitative multiple-case study approach was employed, analyzing 10 Italian family businesses through 30 semi-structured interviews with senior family members, next-generation leaders, and non-family executives. Secondary sources, including company reports and market analyses, were used for triangulation.*

Results. *Findings reveal that family firms build resilience through strategic rhythm and communionship-a mechanism based on relational anchoring, strengthened ties, and trust-based decision-making.*

Research limitations. *This study is limited to Italian family firms, requiring further validation across different cultural and institutional contexts. Employing a longitudinal approach could enhance understanding of how resilience evolves over time.*

Managerial implications. *This study emphasizes the need for inclusive decision-making, trust-building, and a long-term vision as key drivers of resilience. Family firms' ability to integrate stability and adaptability offers valuable insights for managing uncertainty in dynamic environments.*

Originality of the paper. *By introducing the concepts of communionship and strategic rhythm, the paper shifts resilience theory toward a relational model, providing a novel lens to explore family business responses to liquid modernity.*

Key words: *family business resilience; liquid modernity; relations; communionship*

1. Introduction

Resilience is the ability to adapt to adversity (Sutcliffe and Vogus, 2003) and change (Lengnick-Hall and Beck, 2005). Understanding resilience is essential for comprehending how entities withstand and respond to various contexts and contingencies (Southwick *et al.*, 2014). The concept applies

to a variety of scenarios, from environmental systems to communities (Conz and Magnani, 2020; Cutter *et al.*, 2014; Linnenluecke and Griffiths, 2015), and has become a central focus in management research (Conz and Magnani, 2020; Hillmann and Guenther, 2021; Raetze *et al.*, 2022). This research particularly emphasizes resilience as a multifaceted process, highlighting the necessity of context-dependent adaptability (Conz and Magnani, 2020).

Family businesses are especially sensitive to crises due to both external pressures (Soluk *et al.*, 2021) and internal challenges (Bauweraerts, 2016), including family conflicts (Frank *et al.*, 2011), business- and family-related concerns (Baron and Francois, 2020; Kraus *et al.*, 2020), and succession issues (Morris *et al.*, 1996).

Resilience is a key concept for understanding how family businesses endure, adapt, and thrive amid adversity across generations (Azouz *et al.*, 2022; Lumpkin and Brigham, 2011; Lumpkin *et al.*, 2010). By emphasizing resourceful adaptability, intergenerational collaboration, and a long-term orientation, family firms consistently demonstrate distinctive capacities in addressing crises (Chrisman *et al.*, 2012; Conz and Magnani, 2020). They are often viewed as custodians of tradition and are deeply rooted in relational capital. In this context, resilience is frequently defined as the ability to maintain functionality and strategic objectives while recovering from disruptions. This includes proactive preparation, absorptive capacity, and adaptive recovery processes (Ventura *et al.*, 2020; Yilmaz *et al.*, 2024).

The literature highlights several mechanisms underpinning resilience in family businesses (Amann and Jaussaud, 2014; Chrisman *et al.*, 2011; Conz and Magnani, 2020; Gedajlovic *et al.*, 2012). One key mechanism is socio-emotional wealth (SEW), which encompasses family control, emotional attachment, and relational cohesion-factors that enhance the capacity of family businesses to remain resilient during crises (Berrone *et al.*, 2012; Campopiano *et al.*, 2019; Conz *et al.*, 2023; Gómez-Mejía *et al.*, 2011). SEW is closely tied to the preservation of family identity and facilitates cohesive decision-making during challenging periods. Additionally, family firms' resilience is strongly influenced by their unique governance structures, which enable swift and coordinated responses to external shocks (Patel, 2024; Prasad and Roy, 2024). These structures often combine professional management with familial oversight, creating a distinctive approach to crisis management.

Furthermore, the interplay between SEW and entrepreneurial orientation highlights how family firms leverage their socio-emotional resources to innovate under pressure, thereby enhancing resilience (Caicedo-Leitón *et al.*, 2024; López-Nicolás *et al.*, 2024). Another mechanism contributing to resilience derives from the resource-based view, which emphasizes the importance of financial, human, and social capital as critical buffers that enable firms to absorb shocks and maintain stability (Amann and Jaussaud, 2014; Gedajlovic *et al.*, 2012). In family businesses, these resources are further enriched by the relational and cognitive advantages inherent in their familial nature (Habbershon *et al.*, 2003; Morgan and Gomez-Mejia, 2014). Additionally, resilience is strengthened by practices such as knowledge sharing, diversification, and

leveraging intergenerational expertise, which enhance both innovative capacities and adaptive strategies (Calabrò *et al.*, 2021; Conz and Magnani, 2020).

Despite these studies, the traditional framing of resilience encounters significant challenges when examined through the lens of liquid modernity. Coined by Bauman (2000), liquid modernity describes a world marked by constant flux, the erosion of established structures, and the necessity for continuous adaptability. Bauman's (2000) exploration of liquid modernity underscores several paradoxes that directly influence how resilience is conceptualized within family businesses. For instance, while cohesion supports a long-term orientation, it may simultaneously foster inertia, hindering the implementation of necessary adaptive changes (Capolupo, 2022; Soleimanof *et al.*, 2018). Similarly, relational capital-celebrated as a stabilizing force (Casprini *et al.*, 2023; Chrisman *et al.*, 2011)-is increasingly vulnerable in a context where relationships are becoming transactional and ephemeral (Bauman, 2000).

These dynamics challenge the conventional assumption that resilience depends on stable networks and resources. Instead, resilience should be reconceptualized as a dynamic capability, capable of thriving amid the fragmentation and uncertainty that define liquid modernity (Caldwell and Henry, 2020). Conz and Magnani (2020) provide an essential foundation for this reconceptualization by exploring how relational ecosystems and dynamic processes enable firms to adapt and recover effectively in volatile environments.

This research aims to contribute to the ongoing debate on family business resilience by reframing the concept within the paradigm of liquid modernity. It addresses the following research question: *How do family businesses reimagine resilience in response to the challenges posed by liquid modernity?* To answer this question, the study adopts a qualitative approach, which is particularly suited to capturing the nuanced and context-dependent nature of resilience in family businesses. Qualitative methods facilitate an in-depth exploration of family businesses' lived experiences, practices, and perceptions (De Massis and Kotlar, 2014), providing rich insights into how resilience is enacted and negotiated in real-world contexts (Conz and Magnani, 2020). Through a multi-case study (Eisenhardt, 1989; Eisenhardt, 2021; Eisenhardt and Graebner, 2007) of 10 Italian family firms, this research uncovers the mechanisms that family firms employ to redesign their resilience in response to the pressures of liquid modernity.

This study provides three significant contributions to academic discourse. First, it advances a novel theoretical understanding of resilience grounded in Bauman's concept of liquid modernity. Challenging static resilience models, it redefines resilience as a liquid and interconnected capacity shaped by relational and contextual dynamics. This perspective broadens traditional interpretations of resilience, which often emphasize individual or resource-based adaptability, by centering on relational strength and collaborative frameworks.

Second, the research reinterprets SEW as a flexible and evolving resource rather than a static attribute. It demonstrates how family firms adapt SEW to reconcile the tension between heritage and innovation,

thereby reinforcing relational cohesion amid the challenges of liquid modernity.

Third, this study introduces two innovative constructs-resilience rhythms and communionship-as key mechanisms for addressing the complexities of liquid modernity. Resilience rhythms articulate how family firms balance rapid responsiveness with deliberate reflection, achieving alignment between short-term demands and long-term aspirations. Communionship redefines resilience as inherently relational, emphasizing shared meaning, trust, and collective purpose as its foundation. It expands previous studies by detailing the mechanisms through which relational resilience is actively constructed. Together, these constructs offer a renewed perspective on how family firms adapt and strengthen in environments characterized by volatility, fragmentation, and rapid transformation.

2. Theoretical background

2.1 Resilience in family businesses

Resilience in family businesses is often framed as the ability to anticipate, respond to, and recover from crises while preserving the organization's identity and strategic goals (Yilmaz *et al.*, 2024). Conz and Magnani (2020) describe it as a dynamic process marked by proactive preparation, absorptive stability, and adaptive recovery. However, this idealized view may overlook the complexities inherent in resilience, especially during generational transitions (Ventura *et al.*, 2020). Chrisman *et al.* (2011) argue that aligning economic and non-economic goals through robust governance fosters resilience, although maintaining this alignment can be challenging under sustained pressures.

The SEW perspective (Berrone *et al.*, 2012; Gómez-Mejía *et al.*, 2011) suggests that family businesses often prioritize family harmony, legacy preservation, and emotional attachment when facing adversity. While this focus can encourage cohesion (Calabrò *et al.*, 2021), it may also delay necessary strategic shifts. According to Conz *et al.* (2020), resilience is multifaceted and cannot be explained solely by simple trait-based models. Similarly, the resource-based view (Barney, 1991) underscores how distinctive family resources-financial, human, and social-can act as buffers (Yilmaz *et al.*, 2024). However, these advantages do not automatically translate into competitive gains, as power struggles or complacency can undermine their potential (Chrisman *et al.*, 2011).

Scholars also highlight innovation and long-term orientation as essential for sustaining resilience (Cucino *et al.*, 2022). However, even strategic foresight and proactive measures (Conz and Magnani, 2020) may prove insufficient in the face of continuous disruptions, as demonstrated during the COVID-19 pandemic (Pusceddu *et al.*, 2022). While dynamic capabilities (Teece *et al.*, 1997) and adaptive governance structures (Monllor *et al.*, 2023) can enhance organizational agility, these models often address episodic shocks rather than ongoing instability.

Bauman's (2000) concept of "liquid modernity" challenges the assumption that the stability underpinning most resilience theories remains attainable. Consequently, the pursuit of resilience, though valuable, appears less straightforward and demands critical rethinking in light of these "liquid" challenges.

2.2 Family firm resilience in the context of liquid modernity

Liquid modernity is a societal condition characterized by constant flux, uncertainty, and the erosion of traditional structures (Bauman, 2000). It disrupts the stability and continuity of traditional, solid, and enduring institutions. This perspective compels family businesses-traditionally associated with stability and legacy-to confront the challenges of balancing tradition and adaptation in an increasingly unpredictable environment. Bauman (2000) highlights that identity is no longer inherited or fixed in this context but becomes a task of continuous construction. This dynamic creates a paradox for family businesses, as resilience must be rooted in both adaptability and the preservation of identity. Caldwell and Henry (2020) emphasize that despite the dissolution of traditional structures, enduring elements like family cohesion provide a valuable tool for managing uncertainty. Similarly, although not explicitly referring to liquid modernity, Gedajlovic *et al.* (2012) underline that relational capital, deeply embedded in family ties, becomes a critical resource in countering the volatility of modern markets, offering a buffer that is both stabilizing and adaptive. Moreover, SEW becomes a double-edged sword in liquid modernity (Pecis *et al.*, 2024), strengthening relational ties and fostering a sense of continuity while constraining the flexibility required to adapt to rapidly changing external environments. Additionally, other studies implicitly challenge the foundations of liquid society by arguing that family business resilience must include mechanisms that simultaneously honor the family's legacy and embrace innovative practices (Calabrò *et al.*, 2021; Conz and Magnani, 2020; Conz *et al.*, 2023; De Massis *et al.*, 2016; Dessì *et al.*, 2023; Kammerlander *et al.*, 2015). However, understanding which mechanisms are effective through the lens of the main pillars of liquid modernity is particularly intriguing due to the specific characteristics of family businesses.

Ambivalence of emancipation

Bauman defines the ambivalence of emancipation as the liberation of individuals and organizations from inherited roles and societal constraints. This freedom fosters creativity and innovation but also imposes the burden of constant self-definition and decision-making in a fragmented world. Emancipation transforms identity from something "given" into a perpetual "task," requiring continuous management and adaptation to an unpredictable environment.

This force contrasts with the principles underpinning resilience in family businesses, which prioritize legacy, collective identity, and SEW. Family firms often thrive on intergenerational trust and shared values; however, these strengths can also become sources of friction when

confronted with the demands of liquid modernity. Concerning the emancipatory pressures of modernity, while entrepreneurial freedom is vital for innovation, it can conflict with the responsibility to uphold family traditions. Koutsogianni *et al.* (2021) argue that this tension complicates the alignment of entrepreneurial intention with actionable strategy, as leaders must simultaneously foster adaptability and preserve the legacy. Contemporary scholars further emphasize the importance of strategies that respect heritage and tradition while promoting innovation (Argiolas, 2017; Chrisman *et al.*, 2015; De Massis *et al.*, 2015; Floris *et al.*, 2020), enabling family firms to navigate this ambivalence without losing their identity (De Massis *et al.*, 2016; Dessì *et al.*, 2023; Erdogan *et al.*, 2020; Floris and Dettori, 2024; Kammerlander *et al.*, 2015; Rondi *et al.*, 2019), and to leverage flexibility alongside stability (Conz and Magnani, 2020).

Temporal compression and short-termism

The rapid acceleration of change in liquid modernity compresses time, fostering a culture of instantaneity that deprioritizes long-term planning. This phenomenon poses profound challenges for family businesses, whose resilience is deeply rooted in a long-term orientation. Traditionally, family firms emphasize sustainability, legacy preservation, and transgenerational planning as key elements of their strategic outlook (Chirico *et al.*, 2025; Le Breton-Miller and Miller, 2006; Lumpkin and Brigham, 2011; Lumpkin *et al.*, 2010; Memili *et al.*, 2018). However, liquid modernity undermines these foundational principles by replacing stability and foresight with short-termism. Bauman's concept of "liquid time" highlights how this shift disrupts traditional notions of progress, forcing family businesses to abandon long-term strategies in favor of transient and episodic decision-making-a process he terms "instant living" (Bauman, 2000). As Hewer (2022) observes, this temporal compression is mirrored in broader societal behaviors, where marketing and consumer practices increasingly prioritize immediate gratification over sustained relationships or enduring value creation. The pressure to adapt operational timelines to align with the immediacy of societal and economic demands risks eroding the principles that define their resilience. Nevertheless, Bauman's notion of "liquid time" also underscores the critical need for family firms to strike a balance: redefining their timelines to accommodate modern expectations while preserving strategic foresight and enduring objectives.

Perceived uncertainty and risk individualization

Uncertainty in liquid modernity underscores the pervasive unpredictability of societal and organizational life, driven by rapid technological, economic, and cultural shifts. This uncertainty amplifies what Bauman (2000) calls the "individualization of risk," wherein individuals and organizations must navigate volatile environments without the stabilizing support of traditional frameworks. Risks that were once managed collectively through family, community, or institutional structures are now borne by individuals and organizations, creating heightened pressure to adapt and make decisions amid ambiguity (Burgess, 2019). This dynamic poses a paradoxical challenge for family

businesses: the need to remain agile and responsive to external disruptions while safeguarding their embedded values and identity. Family businesses typically emphasize stability, control, and risk aversion (Fernandez, 2025). These firms face increased pressure to ensure financial stability, maintain familial harmony, and protect their legacy for future generations (Zapata-Cantu *et al.*, 2023). The intricate relationship between family dynamics, business strategy, and external market conditions significantly complicates decision-making processes (Udomkit *et al.*, 2023). Moreover, succession planning, internal family conflicts, and the preservation of family values add layers of complexity when confronting uncertainty (Siregar *et al.*, 2024). Additionally, family firms are highly sensitive to path dependence (de Groote and Kammerlander, 2023; Kammerlander *et al.*, 2015; Lorenzo *et al.*, 2022), enormously depending on past successful strategies that often shape future trajectories (Sydow *et al.*, 2009).

3. Methodology

3.1 Research context

The research context is Italy, a country characterized by a high prevalence of family-owned businesses. According to the criteria adopted by AIDAF-EY through the AUB Observatory (AIDAF, n.d.), family firms are defined as companies in which one or two families hold a controlling share of the capital-typically at least 50% in unlisted firms and at least 25% in listed firms-and exert decisive influence over governance and strategic decision-making. Family businesses account for approximately 85% of all Italian companies (Peruzzi, 2025; Murro and Peruzzi, 2019; AIDAF, 2022). This prevalence underscores the critical role of family firms in shaping the Italian economic landscape, contributing significantly to GDP, employment, and innovation. Italian family firms are characterized by a strong emphasis on legacy preservation, which is deeply intertwined with cultural norms, societal expectations, and intergenerational bonds (D'Allura *et al.*, 2025; Dessì *et al.*, 2023; Floris and Dettori, 2024; Manelli *et al.*, 2023). These firms balance tradition and stability with adaptation to global market demands, technological advancements, and evolving consumer preferences (De Massis *et al.*, 2016). Furthermore, Italian family businesses have demonstrated superior resilience compared to their non-family counterparts during economic crises (Dettori and Floris, 2022; Salvato *et al.*, 2020). Moreover, Italy's regional diversity-including industrialized northern regions and less-developed southern areas-creates an ideal setting for studying how family businesses respond to economic and social pressures (Talamo and Sabatino, 2018). In sum, Italian family businesses provide an ideal context for challenging liquid modernity postulates because they must constantly negotiate between the forces of tradition and liquidity; their ability to innovate and professionalize provides valuable insights for managing uncertainty in broader societal contexts (Corbetta, 1995).

3.2 Research design

This study employed a qualitative multiple-case study approach (Eisenhardt, 1989; Eisenhardt, 2021; Eisenhardt and Graebner, 2007), which is particularly well-suited for examining complex, context-specific phenomena within their natural settings (Yin, 2008). This method facilitated both within-case and cross-case analyses (Eisenhardt and Graebner, 2007), allowing for an in-depth investigation of resilience in family firms. The research focused on a sample of Italian family firms operating across diverse industries, selected through purposive (Patton, 1990) and snowball sampling techniques. Purposive sampling was especially advantageous for ensuring that the selected cases were highly relevant to the research question (Etikan *et al.*, 2016). Snowball sampling complemented this by leveraging existing networks to identify additional firms that met the inclusion criteria, thereby enhancing the depth and representativeness of the sample (Biernacki and Waldorf, 1981). Sampling continued until theoretical saturation was achieved, ensuring comprehensive coverage of the phenomena under investigation (Fusch and Ness, 2015; Glaser and Strauss, 1967; Morse, 1995). The final sample consisted of 10 Italian family firms (see Table 1). This sample size aligns with Eisenhardt's (1989) recommendation that an ideal range of 4-10 cases is optimal for a rigorous multiple-case study, balancing detailed analysis of individual cases with effective cross-case comparisons.

The inclusion criteria were as follows: 1. Multigenerational ownership (firms of at least the second generation, to consider different generational perspectives and intergenerational dynamics); 2. Longevity of operations (firms with at least 10 years of activity to ensure a sufficient historical context for studying resilience and adaptation over time); 3. Exposure to relevant external challenges (such as regulatory pressure, globalization, or technological advancements, to provide rich data on resilience practices); and 4. Industry diversity (to capture the multifaceted Italian economic landscape).

Tab. 1: The sample

Firm	Geographical localization	Foundation	Generation	Industry	Number of Employees	Annual Revenue (M €)
Firm A	North	1943	4	Ceramics Manufacturing	250	45
Firm B	Center	1983	2	Wine Production	70	12
Firm C	North	1923	5	Textiles	350	40
Firm D	North	1963	3	Fashion	150	35
Firm E	South and Islands	1960	3	Construction	200	30
Firm F	Center	1979	2	Food Production	120	25
Firm G	South and islands	1981	2	Real Estate	50	15
Firm H	North	1965	3	Electronics	400	60
Firm I	South and Islands	1947	4	Agriculture	20	5
Firm J	South and Islands	1984	2	Legal Services	30	8

Source: Our elaboration

3.3 Data Collection

Data collection involved both primary and secondary sources. Primary data were gathered through semi-structured, in-depth interviews with 30 key informants from 10 Italian family firms, averaging three interviewees per firm. The interviews followed a protocol (Legard *et al.*, 2003) developed after a preliminary study with a sample of 10 individuals to assess the effectiveness of the questions. The focus was on understanding how these firms perceive and respond to the challenges posed by a liquid society and the strategies they employ to maintain resilience. The semi-structured interview protocol (see Appendix A) was designed to explore how family firms perceive and respond to conditions of change, instability, and societal transformation. Consistent with qualitative research principles (Legard *et al.*, 2003), the protocol combined open-ended questions with prompts to encourage participants to reflect on concrete experiences rather than abstract evaluations. Specifically, the interviews addressed five broad thematic areas. First, participants described major changes or disruptions experienced by the firm in recent years (e.g., market shifts, technological changes, crises, or generational transitions) and how these events affected both business operations and family involvement. Second, the interview explored how decision-makers interpret uncertainty and evolving external pressures, with particular attention to how firms make sense of rapid social and economic transformations. Third, questions focused on organizational and strategic responses to these challenges, including adaptations in governance, leadership practices, innovation processes, and long-term planning. Fourth, participants reflected on the role of family involvement in shaping reactions to change, emphasizing generational dynamics, continuity of values, and the relationship between tradition and renewal. Finally, the protocol included questions on future orientation, inviting interviewees to discuss their vision for the firm's trajectory in an increasingly unpredictable environment and the key elements they perceive as essential for sustaining continuity over time. This flexible structure ensured comparability across cases while allowing unexpected themes to emerge inductively from participants' narratives. Each interview lasted between 60 and 90 minutes and was conducted via video conferencing for logistical reasons. The interviews were conducted in Italian-avoiding technical academic terms to facilitate free and natural discussion-audio-recorded, transcribed verbatim, and then translated into English. Interviewee selection was guided by their roles within the firm, ensuring representation from senior family members, non-family executives, and next-generation leaders.

In addition to primary data, secondary data sources were utilized to triangulate the findings-enhancing their reliability and validity (Jonsen and Jehn, 2009; Stake, 1995)-and to provide supplementary information for each case. Table 2 describes the data collected and how it was used.

Tab. 2: Data collection

Data Source Type	Description	Purpose	Details	Number of Documents
Primary Data	In-depth Semi-Structured Interviews	To gather qualitative insights on family firms' strategies and adaptability.	Conducted with 30 key informants across 10 Italian family firms. Each firm had an average of 3 interviewees, including senior family members, next-generation leaders, and non-family executives.	30 interviews
Secondary Data	Company Reports	To provide contextual information and validate primary data findings.	Included annual reports, strategic plans, sustainability reports, and internal documents.	15 documents
	Market Analyses	To understand industry trends and the competitive landscape of the firms.	Sourced from industry publications and external market analysis.	8 documents
	Industry Publications	To supplement findings with broader sectoral insights.	Included sectoral reports relevant to each firm's industry (e.g., manufacturing, wine production).	12 documents
	Internal Firm Documents	To corroborate interview findings and explore strategic decisions in detail.	Covered internal performance reviews, strategic meeting minutes, and product development reports.	10 documents

Source: Our elaboration

3.4 Data analysis

This study adopted an iterative and non-linear data analysis process consistent with established qualitative methodologies (Ravasi *et al.*, 2019). By continuously moving between the data, emerging insights, and relevant theoretical frameworks, we developed a comprehensive understanding of how family businesses reimagine resilience in response to the challenges posed by liquid modernity (Miles and Huberman, 1994; Van Maanen *et al.*, 2007). The steps are as follows.

Step 1: Within-case analysis

The initial stage focused on creating detailed case histories for each of the 10 family firms. This was achieved by integrating primary and secondary data to build chronological narratives. Respondents provided insights into their firms' historical evolution, key decision-making moments, and strategies for addressing external challenges. Secondary data enriched and deepened our understanding of specific information. This process used a temporal bracketing strategy (Langley, 1999) to highlight critical events

and tailored decisions that shaped the firms' ability to maintain resilience while adapting to external pressures over time (Shenton, 2004).

Step 2: Identifying themes through coding

The second step involved open and axial coding of interview transcripts and supplementary data (Denzin, 1997; Denzin and Lincoln, 2011; Miles and Huberman, 1994). Three independent coders reviewed each case history without using software such as NVivo to avoid biases associated with Cohen's kappa (Kim *et al.*, 2016), which calculates reliability at the character level and was therefore unsuitable for our study's higher unit of analysis (e.g., sentences and paragraphs). Initial codes, such as "legacy as a foundation for growth" and "heritage-inspired innovation," were generated. These codes were then refined and organized into broader themes during axial coding, enabling a clearer understanding of recurring patterns. For example, the aforementioned codes were grouped under the axial code "Adaptive identity".

Step 3: Cross-case comparison and thematic synthesis

The third step involved a comparative analysis of 10 Italian family firms to identify both shared and context-specific strategies for managing the complexities of liquid modernity. This analysis illuminated the interplay between tradition and adaptability, revealing three overarching strategies: 1. Leveraging emancipation ambivalence to innovate within legacy frameworks; 2. Synchronizing speed and reflection under temporal compression; and 3. Countering risk individualization through collective strength. This phase underscored the interplay between maintaining core values and adapting to the key pillars of liquid modernity.

Step 4: Validation and integration with theory

Different validation measures were implemented to enhance the reliability of the findings. Member checks were conducted by sharing preliminary results with participants to obtain feedback, ensuring consistency with their experiences and perspectives. Peer reviews by independent researchers added analytical rigor and minimized potential biases (Miles and Huberman, 1994). The sample size was sufficient to achieve saturation (Morse, 1995) and adhered to Eisenhardt's recommendations. In the final stage, the refined findings were synthesized into broader theoretical frameworks that integrated the emergent axial codes, providing an overarching perspective on resilience. This resilience was conceptualized as a form of "relational resilience," rooted in "communionship"-a collective strength that counters and stabilizes the liquid and fragmenting nature of what Bauman defines as liquid modernity.

4. Findings

The results demonstrate that the sample family firms exhibit a nuanced resilience that challenges the main pillars of liquid modernity through specific strategies: 1. Leveraging emancipation ambivalence to innovate

within legacy frameworks; 2. Synchronizing speed and reflection amid temporal compression; 3. Countering the individualization of risk through collective strength.

4.1 Emancipation ambivalence: leveraging emancipation ambivalence to innovate within legacy frameworks

In liquid modernity, family businesses face the dual challenge of maintaining their heritage while adapting to a liquid and unpredictable environment. The dissolution of rigid traditional roles liberates these firms, allowing them to reinterpret their identities. This emancipation is inherently ambivalent, generating tension between preserving SEW and embracing innovation. However, family businesses transform this ambivalence into a strength by leveraging their legacy as a dynamic source of resilience.

Intergenerational collaboration

Intergenerational collaboration is one of the main mechanisms through which family businesses manage this ambivalence. Younger generations challenge traditional norms by introducing innovative ideas and sustainability practices, while elder members anchor these efforts in the family's historical principles. The following text and Table 3 provide interesting quotes.

- Younger generation challenging norms: Next-generation leaders frequently act as change agents. For instance, a COO shared, "My grandfather's principles guide every decision we make, even as we venture into new territories like digital retail. Recognizing the need for change, he has been open to our ideas, embracing innovative solutions that challenge traditional practices (...)". This aligns with Firm E's internal report, which highlights younger leaders' advocacy for sustainability as a strategic opportunity integrated into the firm's long-term plans. Similarly, a sustainability officer remarked, "The younger generation's ideas around sustainability have completely redefined our product lines".
- Elder generation anchoring decisions: Senior family members serve as custodians of tradition, ensuring that innovation aligns with core family values. A founder noted, "Our history and experience are grounding for every innovative leap we take". Supporting this, Firm B's internal documents underscore the alignment between sustainability practices and long-standing family values. A chairperson echoed this sentiment, stating, "The older generation ensures that our innovation doesn't stray from our family's principles".
- Bridging tradition and innovation: Effective collaboration between generations creates a productive balance between tradition and adaptation. As an HR Director described, "It's a constant partnership between honoring tradition and exploring new paths together".

Adaptive identity

Family businesses redefine resilience by viewing legacy not as a constraint but as a foundation for reinvention. This adaptive identity allows them to reinterpret their heritage in ways that inspire innovation and meet contemporary demands.

- Legacy as a foundation for growth: Legacy is perceived as a living entity that evolves with the business. A managing director explained, "We don't view our legacy as a museum piece. It's alive, breathing, and growing alongside us". This sentiment aligns with Firm F's annual report, which emphasizes the integration of sustainability in wine production as part of a legacy redefined through organic practices. Similarly, an owner emphasized, "Every new idea is rooted in our legacy, which serves as our foundation".
- Heritage-inspired innovation: The reinterpretation of heritage is a key driver of innovation. One CMO observed, "We've learned to innovate by embracing our heritage and using it to inspire new directions".

Anchoring innovation

Family firms successfully integrate innovation into their operations by grounding it in their historical values, thereby ensuring both continuity and relevance.

- E-commerce integration: Digital transformation provides a way to sustain traditional crafts in the modern marketplace. A digital marketing manager stated, "Our transition to e-commerce wasn't just about technology; it was about keeping our craft relevant". This success is corroborated by an industry publication, which highlights Firm D's ability to maintain its artisanal roots while embracing digital retail.
- Values as an innovation compass: Family values serve as a guiding framework for decision-making. A chairperson highlighted, "Our family values are the compass that guides our innovation".
- Reimagining traditions digitally: Adapting traditions to digital platforms allows firms to maintain authenticity while expanding their reach. A project manager noted, "We've kept our traditions, but we've also learned to reimagine them for a digital audience". Supporting this, Firm D's internal documents describe how maintaining craftsmanship within digital strategies has strengthened brand loyalty.

Proposition 1: Family businesses in liquid modernity redefine resilience by transforming the ambivalence of emancipation into a dynamic process of legacy reinvention. Through intergenerational collaboration, adaptive identity, and the integration of innovation anchored in core values, these firms balance the preservation of heritage with the need to adapt to liquid and unpredictable environments.

Tab. 3: Emancipation ambivalence - Quotes and illustrations

Axial Code	Code	Quote	Firm & Role
Intergenerational Collaboration	Younger generation challenging norms	"My grandfather's principles shape every decision, even as we break new ground in digital retail".	Firm A, Next-Generation Leader (COO), Female, 34
		"The younger generation's ideas around sustainability have completely redefined our product lines".	Firm F, Next-Generation Leader (Sustainability Officer), Female, 29
	Elder generation anchoring decisions	"Our history and experience provide the grounding for every innovative leap we take".	Firm E, Senior Family Member (Founder), Male, 63
		"The older generation ensures that our innovation doesn't stray from our family's principles".	Firm G, Senior Family Member (Chairperson), Male, 65
	Bridging tradition and innovation	"It's a constant partnership between honoring tradition and exploring new paths together".	Firm C, Non-Family Executive (HR Director), Male, 52
		"Collaboration between generations helps us blend tradition with bold new ideas".	Firm B, Senior Family Member (Owner), Male, 62
Adaptive Identity	Legacy as a foundation for growth	"We don't view our legacy as a museum piece. It's alive, breathing, and growing alongside us".	Firm F, Senior Family Member (Managing Director), Male, 59
		"Every new idea is rooted in our legacy, which serves as our foundation".	Firm B, Senior Family Member (Owner), Male, 62
	Heritage-inspired innovation	"We've learned to innovate by embracing our heritage and using it to inspire new directions".	Firm C, Next-Generation Leader (CMO), Female, 36
		"Heritage isn't a constraint-it's a launchpad for creativity and growth".	Firm A, Next-Generation Leader (COO), Female, 34
Anchoring Innovation	E-commerce integration	"Our transition to e-commerce wasn't just about technology; it was about keeping our craft relevant".	Firm D, Next-Generation Leader (Digital Marketing Manager), Male, 28
		"Digital sales allowed us to bring our traditional products to international markets without losing their uniqueness".	Firm E, Next-Generation Leader (Project Manager), Female, 33
	Values as an innovation compass	"Our family values are the compass that guides our innovation".	Firm G, Senior Family Member (Chairperson), Male, 65
		"Innovation isn't just about progress; it's about remaining true to the principles that built us".	Firm F, Senior Family Member (Managing Director), Male, 59
	Reimagining traditions digitally	"We've kept our traditions, but we've also learned to reimagine them for a digital audience".	Firm E, Next-Generation Leader (Project Manager), Female, 33
		"Bringing our heritage online was a way to keep it alive for the next generation".	Firm D, Digital Marketing Manager, Male, 28

Source: Our elaboration

4.2 Temporal compression: synchronizing speed and reflection under temporal compression

Family businesses face increasing pressure to make quick decisions while maintaining a long-term perspective. Temporal compression-the coexistence of urgency and reflection-challenges firms to synchronize

immediate responses with overarching goals. Family firms manage this tension by establishing strategic rhythms, anchoring decisions in historical narratives, and aligning short-term actions with long-term visions. Interesting quotes can further clarify this concept (see also Table 4).

Strategic rhythm

Family firms establish rhythms that alternate between rapid action and thoughtful reflection, ensuring agility without sacrificing coherence.

- Alternating between action and reflection: Firms adopt structured rhythms to balance quick decision-making with reflective pauses. As noted in Firm E's internal report, "We've adopted a rhythm where fast-paced innovation is balanced by thoughtful strategic reflection, ensuring that we continue to adapt while keeping long-term goals in sight". A CEO from Firm H similarly shared, "Time feels shorter than ever, but we've learned to stretch it-acting quickly when needed and pausing when it matters most".
- Balancing quick wins with strategy: Quick responses should align with broader objectives, ensuring coherence between immediate actions and the firm's vision. A non-family executive from Firm E emphasized, "Quick wins are essential, but they're only valuable when tied to the bigger picture".

Temporal anchoring

Family firms use historical narratives and legacy as stabilizing forces during periods of rapid change. By anchoring decisions in their past, they ensure continuity and coherence amid uncertainty.

- Legacy as a compass to challenge uncertainty: Historical narratives guide the management of modern challenges. Firm I's company report highlights, "Our legacy, rooted in family values and craftsmanship, remains our compass during rapid change. We continuously draw strength from our history as we face modern challenges". An owner from Firm I reinforced this sentiment, stating, "Our past isn't just a story; it's a guide to image the future".
- Strength from family values: Family values provide stability and coherence during times of uncertainty. An owner from Firm I stated, "Our values aren't just ideals; they are the compass that guides every choice we make". Another senior family member shared, "In difficult moments, it's our shared values that keep us united and focused on what truly matters".

Balancing urgency and vision

Family firms align their immediate responses with their overarching mission by integrating short-term adaptability and long-term strategic goals.

- Urgency with an eye on the future: Firms can address immediate challenges while maintaining focus on their broader mission. An owner from Firm D remarked, "We move quickly to meet challenges, but always with an eye on our long-term vision". This aligns with an internal Firm B document, which clearly states their approach to conjugate short-term market responsiveness with long-term sustainability goals.

- Sustainable adaptability: Industry publications further emphasize the balance achieved by firms steadily adopting green technologies, integrating immediate needs with strategic visions for environmental responsibility. Similarly, a senior executive at Firm B argued, "Integrating green technologies wasn't just a market decision; it was a way to ensure our family values align with our long-term responsibility to the environment".

Tab. 4: Temporal compression - Quotes and illustrations

Axial Code	Code	Quote	Source
Strategic Rhythm	Alternating between action and reflection	"Our ability to pause and reassess, even in fast-moving situations, is what keeps us aligned with our strategy".	Firm E, Senior Family Member (Managing Director), Male, 59
		"In our family, we've learned that sometimes stepping back is the fastest way to move forward".	Firm H, Next-Generation Leader (CTO), Male, 32
	Balancing quick wins with strategy	"We take small steps quickly, but always with the bigger goal in mind".	Firm C, Non-Family Executive (HR Director), Male, 52
		"Quick results matter, but only if they're tied to something meaningful".	Firm A, Senior Family Member (Owner), Female, 61
Temporal Anchoring	Legacy as a compass	"Our family's history is a reminder of what matters and a guide for making tough decisions today".	Firm I, Senior Family Member (Owner), Male, 60
		"The values passed down by previous generations are the foundation of every major choice we make".	Firm F, Senior Family Member (Owner), Male, 63
	Strength from family values	"In challenging moments, we rely on our values to unite us and guide the way forward".	Firm B, Senior Family Member (Owner), Male, 62
		"Our shared principles are what keep us steady, no matter how fast the world changes".	Firm A, Next-Generation Leader (COO), Female, 34
Balancing Urgency and Vision	Urgency with a long-term view	"We move fast when needed, but every decision is tied to our broader purpose".	Firm D, Next-Generation Leader (Digital Marketing Manager), Male, 28
		"Our long-term goals are the filter for every urgent action we take".	Firm G, Senior Family Member (Chairperson), Male, 65
	Sustainable adaptability	"Adopting green practices wasn't just about the environment; it was about aligning our legacy with the future".	Firm B, Senior Family Member (Owner), Male, 62
		"Every step towards sustainability is a step towards preserving our family's legacy for future generations".	Firm E, Next-Generation Leader (Project Manager), Female, 33

Source: Our elaboration

Proposition 2: Family businesses in liquid modernity transform the pressures of temporal compression into a competitive advantage by mastering the art of synchronization. Through carefully orchestrated rhythms of action and reflection, they leverage their historical legacy as a stabilizing force, aligning immediate adaptability with visionary goals. This unique capacity to balance urgency and foresight enables them to thrive in a world characterized by constant flux and uncertainty.

4.3 Uncertainty and individualization of risk: countering risk individualization through collective strength

In the context of liquid modernity, uncertainty intensifies the individualization of risk, placing the burden of decision-making and accountability on individuals. Family businesses counter this trend by fostering collective strength and pooling resources. Through shared responsibility, international alignment, and collaborative strategies, they transform vulnerability into resilience, turning uncertainty into an opportunity for cohesion and growth. In the following sections, we further elucidate these concepts with interesting quotes, while additional excerpts are presented in Table 5.

Risk sharing

Family firms address the isolating nature of risk by sharing responsibility among members, ensuring that the burden is shared collectively rather than individually.

- Shared accountability under uncertainty: By spreading risks, family members mitigate the emotional and operational stress associated with decision-making. An owner from Firm E noted, "Every risk we take strengthens our unity. It's never a burden borne alone".
- Intergenerational decision-making: Encouraging shared decision-making across generations reinforces a sense of collective responsibility. Firm E's internal report highlights, "We encourage shared decision-making across all generations. This sense of collective responsibility reduces stress, creating stronger bonds and resilience during difficult times".

Collective adaptation

Family businesses transform uncertainty into a catalyst for shared resilience and mutual growth by aligning values and efforts across generations.

- Resilience through family alignment: Facing challenges collectively fosters stronger bonds and reinforces the firm's resilience. An owner from Firm A stated, "Facing uncertainty together strengthens not only our business but also our family".
- Guided by trust and respect: Family values such as trust and mutual respect play a pivotal role in aligning members during uncertain times. Firm A's company report emphasizes, "Our family business has thrived because of our ability to navigate uncertainty together. The values of trust and mutual respect guide us in adapting to external challenges while strengthening our internal bonds".

Collaborative strategies

Inclusive decision-making allows family firms to mitigate risks and reinforce unity, creating a culture of trust and adaptability.

- Trust as a response to uncertainty: Collaboration strengthens trust and enhances adaptability during periods of volatility. An owner from Firm B observed, "We trust each other during difficult times and crises. The family is our nest, and trust makes us stronger".

- Shared decision-making as a strategic asset: Family firms perceive collaboration as an investment in trust and improved outcomes. A senior family member from Firm H shared, "Our shared decision-making process isn't a delay; it's an investment in trust and outcomes".

Tab. 5: Uncertainty and individualization of risk – Quotes and illustrations

Axial Code	Code	Quote	Source
Risk Sharing	Shared responsibility	"Every risk we take strengthens our unity. It's never a burden borne alone".	Firm E, Owner, Male, 63
		"In our family, no one carries the weight of uncertainty alone; we face it together."	Firm F, Senior Family Member, Male, 61
	Intergenerational decision-making	"We encourage shared decision-making across all generations, which spreads the burden and creates stronger bonds."	Firm E, Owner, Male, 63
		"When we involve everyone in decisions, we ensure the risks are manageable and the rewards shared."	Firm G, Next-Generation Leader, Female, 33
Collective Adaptation	Resilience through alignment	"Facing uncertainty together strengthens not only our business but also our family bonds."	Firm A, Owner, Female, 59
		"It's our ability to come together as a family that turns challenges into opportunities."	Firm B, Owner, Female, 62
	Trust and mutual respect	"Our family values guide us in adapting to challenges while strengthening our internal bonds."	Firm G, Next-Generation Leader, Female, 33
		"Mutual respect across generations is what allows us to face uncertainty with confidence."	Firm H, Senior Family Member, Male, 65
Collaborative Strategies	Trust as a response to uncertainty	"We trust each other to respond to uncertainty, and that trust makes us stronger."	Firm B, Owner, Female, 62
		"Trust isn't just a value-it's the foundation for every decision we make during volatile times."	Firm D, Next-Generation Leader, Male, 28
	Shared decision-making and purpose	"Our shared decision-making process isn't a delay; it's an investment in trust and outcomes."	Firm H, Senior Family Member, Male, 60
		"By involving everyone, we create decisions that reflect our collective wisdom and shared purpose."	Firm C, Non-Family Executive, Male, 52

Source: Our elaboration

Proposition 3: In liquid modernity, family businesses challenge the stereotype of centralized decision-making by embracing collective resilience. Confronted with uncertainty and the individualization of risk, they adopt shared decision-making, intergenerational collaboration, and trust-based strategies. These practices dismantle hierarchical norms, transforming risk into an opportunity to foster unity, adaptability, and sustainable growth.

4.4 Resilience through communionship: relational strength in liquid modernity

The findings propose an integrated perspective that moves beyond focusing solely on individual pillars of liquid modernity, instead

embracing all of them in a more comprehensive and cohesive way. In liquid modernity, where relationships often fragment under the pressures of uncertainty as well as institutional, temporal, and relational disruptions, family businesses emerge as exemplars of relational resilience. Family businesses counter the fragmentation of modern society through what we label "communionship"-the collective capacity to share meaning and confront challenges together. Emancipation, rather than signifying a break from tradition, is reimagined as a collaborative redefinition of roles, where relational ties are strengthened rather than loosened. Family firms transform change into an opportunity to fortify their relational ties, both within and beyond the family, leveraging trust, shared decision-making, and relational ecosystems. The following quotes, along with those inserted in Table 6, illustrate this concept.

Relational anchoring

Relational anchoring enables family businesses to counteract uncertainty by rooting their resilience in shared narratives and values. This connection between the past and present fosters continuity, coherence, and alignment across generations.

- Shared meaning through narratives: Family narratives act as stabilizing forces, helping members manage uncertainty by grounding their actions in a collective history. An owner from Firm G explained, "Our family's history is our anchor-it reminds us of our purpose and guides us forward". Similarly, Firm I's company report highlights, "Our legacy, rooted in family values, remains our compass in times of rapid change".
- Grounding in shared values: Trust and mutual respect serve as crucial unifiers during turbulent times, ensuring that all members remain purposefully united. A senior family member from Firm H stated, "Respect and trust keep us united, especially when faced with difficult times". Firm A's company report further supports this: "The values of trust and mutual respect guide us in adapting to challenges while strengthening our internal bonds".

Strengthening relational ties

Family firms enhance resilience by strengthening internal relationships and cultivating external networks. These ties create a robust support system, enabling the firm to face uncertainty collectively.

- Internal solidarity: Strengthened family bonds transform uncertainty into a unifying force, fostering shared responsibility and mutual support. An owner from Firm F observed, "The more uncertainty we face, the stronger our relationships become-it's what keeps us moving forward". Firm E's internal report adds, "Shared responsibility strengthens bonds and ensures that even the toughest challenges are managed collectively".
- Expanding relational ecosystems: External relationships with advisors, communities, and partners provide flexibility and enhance adaptability during periods of volatility. A non-family executive from Firm E remarked, "Our ability to thrive comes from the connections we've built outside our family". Similarly, Firm I's company report notes,

"Strong relationships with external partners allow us to remain flexible and resilient in uncertain times".

Trust as the foundation

Trust forms the cornerstone of relational resilience, fostering cohesion and enabling inclusive decision-making. It strengthens solidarity and provides a framework for managing volatility with confidence.

- Trust in collaboration: Trust-based collaboration enables family firms to align immediate responses with long-term goals, creating stability during periods of uncertainty. A next-generation leader from Firm D remarked, "'Trust isn't just a value-it's the foundation for every decision we make". Firm B's internal documents further highlight, "'Trust ensures that we remain consistent and united, even during volatility".
- Inclusive decision-making: Family firms strengthen accountability and trust by involving all members in the decision-making process. A senior family member from Firm C explained, "Our decisions reflect the wisdom and shared purpose of the entire family". Firm E's internal report echoes this sentiment: "Collaborative decision-making unites generations, fostering trust and shared responsibility".

Tab. 6: Resilience through communionship - Quotes and illustrations

Axial Code	Code	Quote	Source
Relational Anchoring	Shared meaning through narratives	"Our family's history is our anchor-it reminds us of our purpose and guides us forward".	Firm G, Owner, Male, 60
		"We use our past to guide us when the future feels uncertain-it's our foundation".	Firm F, Senior Family Member, Female, 59
	Grounding in shared values	"Respect and trust are what keep us united, especially when faced with difficult times".	Firm H, Senior Family Member, Male, 65
		"Mutual respect is what allows us to adapt together, no matter the challenge".	Firm C, Owner, Male, 62
Strengthening Ties	Internal solidarity	"The more uncertainty we face, the stronger our relationships become-it's what keeps us moving forward".	Firm F, Owner, Male, 63
		"Shared responsibility keeps us grounded-it's our way of staying strong together".	Firm C, Next-Generation Leader, Female, 36
	Expanding relational ecosystems	"Our ability to thrive comes from the connections we've built outside our family".	Firm E, Non-Family Executive, Male, 45
		"Building strong partnerships beyond the family has made us more resilient to market changes".	Firm I, Owner, Male, 62
Trust as the Foundation	Trust in collaboration	"'Trust isn't just a value-it's the foundation for every decision we make".	Firm D, Next-Generation Leader, Male, 28
		"In uncertain times, trust ensures we can act as one and stay focused".	Firm G, Senior Family Member, Male, 60
	Shared decision-making and purpose	"Our decisions reflect the wisdom and shared purpose of the entire family".	Firm C, Senior Family Member, Male, 60
		"Including everyone in the decision-making process strengthens both trust and outcomes".	Firm E, Non-Family Executive, Male, 45

Source: Our elaboration

Proposition 4: In liquid modernity, family businesses redefine resilience as a relational and dynamic process that transforms challenges into opportunities for unity and adaptability. Communionship emerges as the key mechanism, fostering resilience through shared meaning, collaboration, and trust-not just as an outcome but as its foundation and driving force. This process unfolds across three interdependent dimensions: Sense

Making (Relational Anchoring), which ensures continuity through shared narratives and values; Sense Giving (Strengthening Relational Ties), which reinforces resilience via internal solidarity and external networks; and Sense Sharing (Trust as the Foundation), where trust-based collaboration and inclusive decision-making sustain long-term adaptability.

5. Discussion and conclusion

This study aimed to explore how family businesses reconceptualize resilience through the lens of liquid modernity. Our findings suggest that resilience in this context cannot be reduced to a stable organizational attribute or a purely strategic capability, as is often assumed in traditional resilience research (Lengnick-Hall and Beck, 2005; Duchek, 2020). Instead, resilience emerges as a relational and processual accomplishment, rooted in communionship and enacted through shared meaning, trust, and collective purpose. Consistent with prior work emphasizing the dynamic and context-dependent nature of resilience (Conz and Magnani, 2020; Hillmann and Guenther, 2021), our cases confirm that family firms rely on relational resources and intergenerational cohesion to sustain adaptability under adversity. By situating these mechanisms within Bauman's (2000) notion of liquid modernity, this study extends existing frameworks by highlighting resilience not as "bouncing back" from episodic shocks, but as the ongoing capacity to remain cohesive while operating amid permanent flux.

One key insight concerns the reconceptualization of emancipation. Liquid modernity often frames emancipation as the dissolution of inherited roles and stable structures (Bauman, 2000), which can potentially undermine continuity and identity. Our findings indicate that family businesses reinterpret emancipation not as a rupture but as a collaborative reinvention of roles across generations. This process enables firms to harmonize innovation with legacy, supporting recent research that demonstrates how family firms navigate the paradox of tradition and change (De Massis *et al.*, 2016; Kammerlander *et al.*, 2015). In this context, SEW does not merely function as a protective endowment (Berrone *et al.*, 2012) but becomes a flexible relational resource that families actively mobilize to sustain identity while enabling renewal.

Time also plays a pivotal role in shaping resilience under liquid conditions. Whereas temporal compression and acceleration are typically viewed as destabilizing forces that erode long-term orientation (Bauman, 2000; Rosa, 2013), our findings reveal that family firms respond by developing strategic rhythms that alternate between agility and reflection. This extends dynamic capability perspectives (Teece, 2007) by suggesting that temporal adaptability in family firms is deeply intertwined with collective narratives and relational anchoring, rather than being solely driven by managerial routines or market responsiveness.

Finally, uncertainty-often portrayed as a destabilizing condition that fragments organizational ties-emerges in this study as a catalyst for relational cohesion. Contrary to the individualization of risk characteristic

of liquid modernity (Bauman, 2000), family firms counter volatility through trust-based decision-making and shared accountability. This finding reinforces recent calls to examine resilience as a collective and relational phenomenon (Conz and Magnani, 2020), showing that connection and mutual reliance may serve as critical mechanisms for sustaining organizational continuity in environments where institutional and relational structures are increasingly fragile.

At the heart of this relational resilience is communionship. Unlike dominant models that emphasize individual adaptability or resource buffers, communionship highlights resilience as embedded within enduring relational networks and collaborative meaning-making. By transforming liquidity into cohesion through trust, alignment, and inclusive governance, family businesses demonstrate how strong relational infrastructures can thrive even amid societal fragmentation. In doing so, this study contributes to resilience scholarship by advancing a relational model of resilience particularly suited to understanding family firms operating in the uncertain and fluid landscapes of liquid modernity.

Implications and contributions

This study offers critical theoretical and practical contributions by reconceptualizing resilience within the context of liquid modernity and providing new insights into family business dynamics. By integrating these findings with existing frameworks, it extends the study of resilience beyond traditional models, effectively addressing the realities of an increasingly liquid socio-economic environment.

Theoretical contributions

This study makes significant contributions to the literature on resilience, family businesses, and liquid modernity by introducing a novel conceptualization of "relational resilience" rooted in communionship. By situating the findings within Bauman's (2000) framework of liquid modernity, the research addresses critical gaps in understanding how family businesses face the challenges posed by liquidity, uncertainty, and individualization. This approach not only broadens the theoretical landscape of resilience but also challenges prevailing assumptions about family firms in contemporary contexts.

First, this study advances the discourse on resilience by shifting the focus from individual adaptability to relational dynamics. Traditional resilience frameworks often emphasize individual traits or organizational-level capabilities (e.g., Holling, 1973; Lengnick-Hall and Beck, 2005). However, this research highlights the pivotal role of intraorganizational and interorganizational relational strength in fostering adaptability, particularly in family businesses. The introduction of communionship as a core mechanism underscores how shared meaning, trust, and collective decision-making form the backbone of resilience in family firms. Communionship extends the concept of collectiveness, as articulated by Conz and Magnani (2020), by emphasizing not only shared meaning and trust but also the deeper, enduring relational strength that transforms liquidity into stability. Communionship can be considered a

process-based framework for relational resilience, capturing the active, ongoing construction of relational strength. The three dimensions of communionship-sense making, sense giving, and sense sharing-offer a novel lens to understand how family businesses maintain resilience by leveraging trust, shared meaning, and collaborative decision-making. If collectiveness means "the development of coordinative and interactive dynamics both inside and outside the firm, promoting a shared and positive vision among employees, and outside the firm, participating in the community planning activities, leading to trust and creativity in problem-solving" (Conz, Magnani 2020: 404), communionship explains the dynamics of the process that allow a group of people to be and to act as a "collectiveness". This perspective challenges the dominant narrative of resilience as a solitary process, offering instead a relational model that positions family firms as exemplars of collective adaptability.

Second, the study advances our understanding of temporal dynamics in resilience by introducing the concept of rhythm as a mechanism to manage the temporal complexity inherent in liquid modernity. Liquid modernity accelerates the pace of time, demanding swift decisions while often undermining strategic coherence (Rosa, 2013). Family firms address this challenge by establishing a dual rhythm of agility and reflection, enabling them to respond rapidly to immediate pressures without losing sight of long-term goals. This concept of rhythm adds an important dimension to resilience theory, demonstrating how firms can harmonize short-term adaptability with long-term stability. By anchoring this rhythm in shared narratives and relational trust, family firms provide a unique framework for balancing temporal demands in a constantly evolving environment.

Third, this study extends the understanding of SEW by demonstrating how it evolves in response to liquid modernity. While prior research (e.g., Berrone *et al.*, 2012; Gómez-Mejía *et al.*, 2007) has established the importance of SEW in preserving family-centric goals, this study reveals how SEW can be dynamically leveraged to counteract the fragmenting forces of liquid modernity. Family firms transform SEW into a source of relational cohesion, enabling them to overcome challenges such as emancipation, temporal disruption, and uncertainty while maintaining alignment across generations. This contribution bridges the gap between SEW theory and resilience literature, offering new insights into how emotional and relational capital can drive long-term adaptability. Fourth, this research challenges the stereotype of family businesses as hierarchical and resistant to change (e.g., Miller *et al.*, 2008). In contrast, the findings reveal how family firms dismantle centralized decision-making structures by fostering inclusive, trust-based collaboration. By reinterpreting emancipation as a collaborative reinvention of roles, family firms defy traditional notions of rigidity and emerge as flexible, relationally adaptive organizations. This redefinition positions them as key actors capable of thriving amid the uncertainty of liquid modernity, offering a fresh perspective on organizational adaptability.

Finally, this study contributes to the emerging discourse on liquid modernity and organizations (Bauman, 2000; Rosa, 2013). While much of the existing literature has focused on the destabilizing effects of liquid

modernity, this research highlights how family businesses counter these forces by solidifying their relational structures. By embedding resilience in communionship and rhythm, family firms create networks of relational strength that contrast with the liquidity of their external environment. These insights provide a robust theoretical framework for understanding how organizations can thrive amid societal fragmentation.

Practical implications

Family businesses challenge liquid modernity by redefining resilience through relational strength and communionship. This study underscores the importance of relational resilience as a strategic asset, emphasizing that trust, shared purpose, and inclusive decision-making foster stability and adaptability. Anchoring decisions in narratives and shared histories helps maintain coherence during change, ensuring continuity while embracing innovation.

The concept of rhythm emerges as a crucial mechanism that enables firms to balance agility with long-term vision. Likewise, collective risk management strengthens resilience by distributing responsibility across generations and stakeholders, transforming uncertainty from an individual burden into a shared challenge. Expanding relational ecosystems, including external networks, further enhances resilience and adaptability.

Additionally, communionship redefines leadership as a relational practice that prioritizes trust and collaboration over hierarchy. Organizations can benefit from training leaders to cultivate strong relationships and embed solidarity at the core of resilience.

Limitations and further studies

This study, while offering valuable insights, has certain limitations. Contextual specificity is a key constraint, as the focus on Italian family businesses may limit the generalizability of the findings. Future research should explore relational resilience and communionship in different cultural and economic settings, particularly within individualistic and collectivist societies.

The study's cross-sectional design captures resilience at a single point in time, preventing an analysis of its evolution. Longitudinal studies could provide deeper insights into how family firms adapt to shifting external pressures.

Additionally, the research relies on qualitative data, offering depth but lacking broad statistical validation. Future studies could incorporate quantitative methods to compare resilience practices across different industries and firm sizes.

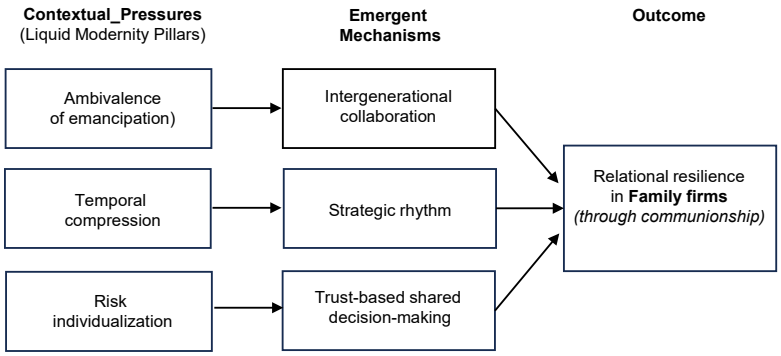
The concept of rhythm, introduced as a novel contribution, requires further exploration. Future research should examine its underlying mechanisms, its impact on organizational performance, and whether it extends beyond family firms.

While internal relational dynamics are well explored, the role of external networks remains underdeveloped. Further studies could analyze how family businesses leverage external relationships-with communities, advisors, and partners-to enhance resilience.

Moreover, communionship, although central to this study, remains in the early stages of theoretical development. Future research should refine this concept by exploring its applicability beyond family firms and examining its role in fostering resilience across different organizational forms. Comparative studies between family and non-family businesses could help clarify their unique features and broader relevance.

As a final development, future research could build on our inductive insights by testing an emerging conceptual model that links the structural pressures of liquid modernity to family firm resilience through the relational mechanisms identified in this study. Figure 1 summarizes this tentative framework, proposing that emancipation ambivalence, temporal compression, and risk individualization shape resilience through strategic rhythm and communionship. This model offers a basis for subsequent quantitative and longitudinal validation across broader institutional contexts.

Fig. 1: Emergent conceptual model of relational resilience in family firms under liquid modernity



Source: Our elaboration

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APPENDIX A - Semi-Structured Interview Guide

The following interview protocol was used as a flexible guide to ensure comparability across interviews while allowing respondents to elaborate freely on their experiences. Questions were adapted depending on the interviewee's role (senior family member, next-generation leader, or non-family executive).

Section A. Firm Background and Demographic Information
Firm profile
Could you briefly describe the history of the firm?
In which year was the firm founded?
Industry and activities
What are the firm's main products/services?
Which markets (local, national, international) does the firm primarily serve?
Size and structure
Approximately how many employees does the firm currently have?
How would you describe the organizational structure (centralized, decentralized, professionalized)?
Generational stage
Which generation is currently leading the firm?
How has leadership evolved across generations?
Family involvement
What roles do family members currently play in ownership, governance, and daily management?
Are non-family managers involved in key decision-making processes?
Recent evolution
Have there been significant changes in the firm's strategy, structure, or governance in recent years?

Section B. Experiences of Change and External Challenges
Key challenges
Can you recall a period of major change, disruption, or uncertainty affecting the firm?
What were the main external pressures or events that triggered this situation?
Impact on the firm
How did these challenges influence business operations and internal dynamics?
Broader transformations
In your view, how has the business environment changed over the last decade?

Section C. Strategic and Organizational Responses
Adaptation strategies
How did the firm respond to these challenges?
Were there specific strategic adjustments or innovations introduced?
Decision-making under uncertainty
How are key decisions typically made when facing unpredictable conditions?
What factors shape strategic priorities in such situations?
Governance and leadership
Did the firm modify governance structures or leadership practices in response to change?

Section D. Family Dynamics and Continuity

Role of the family

In what ways does family involvement influence how the firm reacts to change?

Tradition and renewal

How do you balance respect for the firm's heritage with the need to adapt or innovate?

Intergenerational perspectives

Are there differences in how senior and younger generations perceive change and uncertainty?

How are these differences managed?

Section E. Resources, Relationships, and Support Systems

Internal resources

What internal strengths (e.g., values, capabilities, people) help the firm with difficult periods?

External relationships

Do external partners, advisors, or networks play a role in supporting the firm during challenging times?

How important are community or stakeholder relationships?

Section F. Future Orientation

Looking ahead

How do you envision the future of the firm in an increasingly uncertain and fast-changing environment?

Sustaining continuity

What do you see as essential for ensuring the long-term continuity of the business?

Final reflection

Is there anything else you would like to add regarding how the firm deals with change, uncertainty, or transformation?

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Exploring the cultural heritage dimension of the country image: A textual analysis of web narratives across twenty-four countries [1] [2]

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Abstract

Frame of the research. *This study examines how nations with rich cultural resources structure their institutional communication to enhance the understanding of cultural heritage's role within the promotion of country image.*

Purpose of the paper. *The study investigates the role of cultural heritage within the general framework of country image and proposes an explorative categorization of the constitutive dimensions of the "cultural heritage image".*

Methodology*. The empirical research is based on a lexical analysis of the institutional web communication of twenty-four countries ranked in the Anholt-Ipsos Nation Brand Index 2023 (Ipsos, 2023).*

Results*. The textual analysis enabled the analytical identification of the constituent aspects of the cultural heritage image, revealing a network of nodes centered on three macro-dimensions (Tangible cultural heritage, intangible cultural heritage and national identity), and 13 major conceptual categories (i.e., historic sites, cultural institutions, natural environment, craftmanship, visual arts, performing arts, literature, language, gastronomy, traditions, sports, people, diversity, equity and inclusion).*

Research limitations. *The main limit of the study is related to the size and variety of the selected documents.*

Managerial implications. *The study can support both policy makers and companies in the definition of international marketing strategies aiming to emphasize the role of cultural heritage in the perception of international audiences.*

Originality of the paper. *The study contributes to the international marketing literature by filling scientific gaps related to the categorization of the constituent components of cultural heritage image connected to the macro dimension of country image.*

Key words: *country image; cultural heritage; cultural heritage image; textual analysis; cross-country study*

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1. Introduction

In recent years, a country's image and reputation have become increasingly significant in marketing literature, which aims to create models for analyzing and measuring various components of image, as well as in nation branding strategies designed to enhance the prominence and identity of national systems in global markets. An established reputation generates resources by the fact that it is difficult to be imitated by other contexts. Non-duplicability derives from the possession of unique resources that have been formed and consolidated over time. In these terms, the reputational component becomes a barrier to mobility, in so far as it allows the country to consolidate its position at the international level, facilitating the activation of relationships, partnerships and strategic alliances with the different publics that populate the broad reference context. Reputation has, therefore, a cognitive value and efficacy, and its goodness derives from the comparison between the country's behavior and performance, and its social and value identity. In this view, we can observe an active role of the cultural environment in the foreign policy and attractiveness of a nation. In fact, within the framework of globalization and cultural convergence, the authenticity of cultural heritage serves as a significant asset for establishing a unique identity and fostering a feeling of community, thereby influencing tourism and various economic sectors of the nation (Poor and Snowball, 2010). For example, in economics, there has been much discussion about how cultural heritage affects a country's prosperity (Rizzo and Throsby, 2006). This contribution is acknowledged as originating from both intangible components, such as habits, abilities, and practices like music, dance, theater, and cuisine, which are maintained and passed down through the generations, as well as from tangible cultural assets, such as monuments, heritage sites, buildings, and artwork (Unesco, 2003). Furthermore, tourism and management research has made the marketing and management of arts and heritage destinations a specific subdiscipline (Millar, 1989; Colbert and St-James, 2014). With respect to the international marketing literature, studies in this field have extensively explored the impact of country image on foreign consumers' perceptions and behaviors. Country image is broadly defined as "the sum total of all the descriptive, inferential, and informational beliefs that a person has about a particular country" (Martin and Eroglu, 1993: 193). This concept encompasses a collection of generalized perceptions about a nation's political maturity, economic progress, industrial development, as well as its traditions, culture, and population. However, although several definitions of country image consider cultural heritage as a constituent dimension of the construct, for example, Verlegh and Steenkamp (1999: 525) define country image as a set of "mental representations of a country's people, products, culture and national symbols", cultural heritage has received relatively little attention in the international marketing literature, despite expanding recognition in adjacent domains (Mainolfi *et al.*, 2024). The literature review reveals only recently two proposals to systematize the cultural component (Hakala *et al.*, 2011; Rojas-Mendez, 2013), which, however, appear to be elaborated with a predominantly inductive

approach, unable to exhaust the theoretical domain of the construct. Based on these scientific gaps, the goal of this study is to develop a preliminary framework for comprehending the image of national cultural heritage, led by the international marketing perspective. The study aims at identifying the primary conceptual categories that may represent a tool to measure the cultural heritage image. The results of a lexical analysis of online communication around cultural heritage are then presented in the study. The primary goal of the study was to compare the content structure commonly employed in cultural heritage promotion to identify key themes that may shape the image of the cultural heritage of a nation.

2. The role of cultural heritage dimension in country image literature

The theoretical foundation of this study is rooted in a well-established body of literature, closely linked to the country-of-origin phenomenon. Extensive research in this field suggests that country image acts as an extrinsic cue that consumers rely on to evaluate foreign-produced goods (Eroglu and Machleit, 1989; Papadopoulos *et al.*, 2018). Within this broad domain, numerous studies have aimed to identify the key factors that contribute to the formation of country image (Han, 1989; Martin and Eroglu, 1993; Parameswaran and Pisharodi, 1994). Initially, this concept was primarily defined through cognitive elements, reflecting rational beliefs about various national attributes. However, more recent scholarship has confirmed the multidimensional nature of country image, incorporating an affective dimension - capturing the emotional associations with a country - and a conative dimension, which represents the willingness to engage with it (D'Astous and Ahmed, 1999; Laroche *et al.*, 2005). Within this cognitive-affective framework, several general definitions of country image have integrated aspects of a nation's cultural heritage. For example, Bannister and Sanders (1978, p. 152) defined country image as "the generalized image created by such variables as representative products, economic and political maturity, historical events and relationships, traditions, industrialization, and degree of technological virtuosity." Similarly, Allred *et al.* (1999, p. 36) also pointed out that "the perception of a country is based on its economic condition, political structure, culture, conflicts with other countries, working conditions, and position toward environmental issues."

Although some scholars seem to recognize a broader role for culture as a distinctive component of a nation's competitive identity, as "the cultural aspect of the national image is irreplaceable and irreproducible because it is uniquely tied to the country itself; it is reassuring because it links the country's past with its present, (...); and it is uplifting because it shows the spiritual and intellectual qualities of the country's people and institutions" (Anholt, 2007, p. 133), studies have limited the interpretation of the cultural heritage image to a simple evaluation of some population traits (Verlegh, 2001; Van Ittersum *et al.*, 2003) or to a specific attribute of tourism destination image related to the endowment of cultural attractions and sites (Gallarza *et al.*, 2002). Only relatively few studies have sought to operationalize the cultural heritage aspect within the broader country

image construct (Hakala *et al.*, 2011; Rojas-Méndez, 2013; Buhmann, 2016; Buhmann and Ingenhoff, 2015). A literature review (see tab. 1) on country image reveals only recently two proposals for systematizing the cultural component, but these are elaborated with a predominantly inductive approach and do not appear able to exhaust the theoretical domain of such an extremely complex construct. The first attempt is contained in a study by Hakala *et al.* (2011) in which it is acknowledged that "studies on national cultural heritage are scarce" (Hakala et al, 2011, p. 448) and a measurement system is proposed based on two dimensions: homogeneity, understood as the degree of dominance of a single language and religion, and endurance, measured through the number of Unesco awards obtained by a given country. The second is reported in a more recent study by Rojas-Mèndez (2013), in which the author, using the free elicited response technique with respect to perceptions referred to 26 different nations, associates the culture and heritage dimension with a wide range of attributes (monuments, traditions, historical figures, gastronomy, religion, education, sports and colors), limiting himself, however, to a simple listing devoid of attempts at systematization and operationalization. An additional contribution is provided by Jung *et al.* (2014), who include a "cultural assets" dimension within their country image framework. Nevertheless, the study does not present a fully developed measurement scale, as the items related to cultural assets are adapted from previous literature and mainly serve to assess the influence of cultural perceptions on brand evaluation, rather than to comprehensively operationalize the cultural dimension of country image. In 2016 Buhmann proposed a comprehensive model for measuring country image, identifying four key dimensions: functional, normative, aesthetic and emotional. The aesthetic dimension involves beliefs regarding a country cultural and natural attractiveness and including opinions about the beauty of the natural environment, the appeal of national culture and the richness of its traditions. However, some limitations prevent its generalizability and usability. The author does not clarify how the items submitted to the measurement scale validation process were obtained. Moreover, the model was tested using students' samples from specific countries, such as Switzerland, thus compromising the model's cross-national validity.

Coming out of the more purely academic sphere, a further proposal for measuring the role of cultural heritage in the perceived image of a nation is that contained in the Anholt-Ipsos Nations Brand Index (Ipsos, 2023), which places the heritage and culture dimension among the pillars underlying the recognition and strength of a nation's brand. However, the limited variety of dimensions used, linked mainly to the endowment of tangible cultural resources - natural beauty, monumental attractions, history and art - does not seem able to represent the complex nature of a nation's cultural identity and sense of place, understood as "the ways of living developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expressions and values" (Icomos, 2002, p. 21).

Tab. 1: Main operationalizations of the country image construct

Dimensions	Operationalisations	Contributions
Cognitive country image	*People facets* (e.g., friendly and likable; artist and creative; well-educated; hard working)	Parameswaran *et al.* (1987); Parameswaran and Pisharodi (1994); Papadopoulos *et al.* (2000)
	Economy (e.g., raised standard of living; quality of products; economic environment; level of industrialisation)	Marting and Eroglu (1993); Parameswaran and Pisharodi (1994); Pappu *et al.* (2007)
	Technology (e.g., technical skills, technological research)	Martin and Eroglu (1993)
	Politics (e.g., political stability, participation in international affairs)	Heslop *et al.* (2010); Knight *et al.* (2003)
	Climate (e.g., human, nature and climate factor)	Van Ittersum *et al.* (2003)
	Social context (e.g., individual rights and freedom, alignment with own country)	Heslop *et al.* (2010); Passow *et al.* (2005)
	Cultural assets (e.g., this country possesses its own cultures that are differentiated from those of other countries, this country has affluent cultural assets, this country has cultural symbols which represent this country)	Jung *et al.* (2014)
	Culture heritage (e.g., homogeneity and endurance; national culture, gastronomy, sports, history, attractions, traditions, colours, religion)	Buhmann and Ingenhoff (2015); Rojas-Mendez (2013); Hakala *et al.* (2011)
	Aesthetic dimension (e.g., cultural goods, culinary, history and tradition, landscape and scenery)	Buhmann (2016); Buhmann and Ingenhoff (2015)
	Sustainability (e.g., environmental pollution controls)	García-de-Frutos and Ortega-Egea (2015); Heslop *et al.* (2010); Passow *et al.* (2005)
Affective country image	*Positive and negative country affect* (e.g., positive feelings, pleasant feelings, enthusiastic feelings, distrustful, irritated, hostile)	Aydin *et al.* (2021); Harmerling *et al.*, (2015); Verlegh (2001); Brijs (2006)
	Intergroup affect and stereotype (BIAS) (e.g., contempt and admiration)	Maher and Carter (2011)
	Emotional dimension (e.g., country fascination, sympathy, attractiveness)	Buhmann and Ingenhoff (2015)

Source: Adapted from Mainolfi *et al.* (2024).

3. Revealing the cultural heritage dimension of country image: a web-based textual analysis of the communication of twenty-four countries

In order to contribute to a correct interpretation of the role of cultural heritage within the theoretical domain of country image (cultural heritage image), and at the same time to highlight the thematic structure of institutional communication adopted by nations characterized by a high endowment of cultural resources, in this study a textual analysis was conducted on the institutional web-based cultural heritage communication as chosen by twenty-four prominent nations. The inductive approach was chosen because of the widespread use of contemporary communication systems, which reveal the quirks and signaling components of a country's cultural heritage, albeit with wildly disparate modalities and results (Napolitano *et al.*, 2015; Marino and Mainolfi, 2013). From a methodological point of view, the study was developed through three main phases: data collection, analysis and interpretation of results.

3.1 Sample and data collection

Twenty-four nations that were ranked in the Anholt-Ipsos Nations Brand Index 2023 (Ipsos, 2023), one of the most widely used metrics for evaluating the power of a national brand, were the subject of the textual analysis. The selection of countries was made by first including the top ten countries according to the Nation Brand Index (Ipsos, 2023) and then adding countries, one after the other, so that each continent was represented by at least three countries. Consequently, the sample is composed as follows: Europe (France, Italy, Germany, Sweden, Switzerland, United Kingdom), Africa (Egypt, Morocco, South Africa), Asia (China, Japan, South Korea), Middle East (Israel, Qatar, UAE), North America (Canada, Mexico, USA), Oceania (Australia, New Zealand, Vanuatu[3]), South America (Argentina, Brazil, Peru).

In the first stage, the units of analysis were identified by consulting documents published on the official websites of the national bodies responsible for managing and promoting the cultural heritage of twenty-four prominent countries. These documentary units became the "data" for the research. Although they may contain incomplete information due to the formal nature of their representation, they nonetheless serve as an invaluable source of knowledge about the phenomenon under investigation. As mentioned, this study prioritized data collection from websites, which primarily facilitate asynchronous, static communication, designed to be publicly accessible with limited opportunities for interaction. Websites were chosen over other communication channels due to their ability to present multimedia narratives, timelines, and historicized representations of a nation's heritage (Cerquetti and Romagnoli, 2023). The primary focus of this phase was analyzing the websites of the Ministries of Culture, Tourism, and Cultural Heritage. Given the diversity of governance structures across countries, the analysis was also extended to the websites of Ministries of Foreign Affairs, which, in many cases, host sections dedicated to promoting the cultural sector. Additionally, in cases where a specific ministry was absent, the presence of government departments responsible for cultural protection and promotion was verified. Following this approach, the analysis also included communication documents related to institutional experiences of country branding.

From a procedural perspective, within each analyzed website, texts used to describe or narrate the characteristics and distinctive qualities of cultural heritage were selected. To enable comparison of the syntax adopted by different countries, only texts written in English were selected and downloaded. The initial keywords that guided the selection of texts were: "cultural heritage," "heritage," "culture," "traditions," and "history." However, given the exploratory nature of the study, the selection criteria were refined and validated throughout the research process, incorporating additional keywords such as "cultural identity," "people," and "community".

[3] For Oceania, since there were not three countries (the NBI has only 50 positions, so it does not rank all countries), the country with the highest number of tangible and intangible UNESCO sites was chosen, so in addition to Australia and New Zealand, Vanuatu was added.

In line with the objectives of the study, technical texts describing the architectural, historical, and artistic value of cultural assets and activities were excluded. Instead, priority was given to the role that cultural assets play within the system of values and symbols of the national community. Following this approach, the scope of the data collection process was rigorously defined and limited.

3.2 Corpus analysis

The selected texts were analyzed using NVivo 11 software, which facilitated data segmentation and archiving. The textual analysis was conducted in three iterative phases (Bolasco, 2005; Carley, 1993). The first phase involved data pre-processing through text normalization. Textual forms were identified, counted, and subsequently standardized to account for orthographic variations, such as the uniform spelling of names, acronyms, and abbreviations. This was followed by an evaluation of the vocabulary, comprising about 10,000 word-types and a total of about 95,450 word-tokens. This procedure was instrumental in selecting a set of significant words (theme words) to facilitate content interpretation. The general vocabulary was then refined by removing "empty" words (stop words), which are non-significant for the analysis as they serve only instrumental or grammatical functions (e.g., conjunctions, prepositions, adverbs) (Riviezzo *et al.*, 2014). Subsequently, the data were decomposed through an open coding process guided by the identification of the most frequently occurring words. As expected, the most frequent word-types included "culture" (1,261 occurrences), "heritage" (957 occurrences), and "arts" (781 occurrences). Other notable word-types included "nation" (751 occurrences), "works" (484 occurrences), "people" (412 occurrences), "museums" (393 occurrences), "tourism" (382 occurrences), "community" (355 occurrences), "design" (300 occurrences), "historic" (315 occurrences), and "traditions" (222 occurrences). The word cloud generated through textual analysis provides a clear and effective visual representation of the most recurrent terms in communications related to cultural heritage (Figure 1).

Fig. 1: The word cloud

Source: Authors' elaboration.

Among the frequently occurring word types not previously highlighted, the terms "creative," "artists," and "films" are also noteworthy. This finding underscores the significance of artistic expressions and the creative industries in cultural heritage, reflecting the vital role of artists, film productions, and musical performances in shaping cultural identity and enriching the socio-cultural fabric of communities. Table 2 presents the ten most frequently occurring words in the institutional communication documents of various countries, revealing key trends and differences in how cultural heritage is leveraged and promoted. As can be seen from this partial analysis, several countries, including Canada, France, Germany, UK, South Korea and Italy, demonstrate a strong emphasis on "heritage" and "cultural", reflecting a shared commitment to preserving and promoting both tangible and intangible cultural heritage. Moreover, the words "arts" and "culture" are present in countries such as Japan, the United Kingdom, the USA and Australia, underscoring a universal commitment to promoting the arts as an integral part of national identity and international dialogue.

As expected, reference to tourism is a cross-country theme, and this is evident from the presence of the words such as "tourism" (France, Italy, Canada, USA, Japan, South Africa, New Zealand), "tourist" (Mexico), "visitors" (New Zealand) and "destination" (Brazil). This trend aligns with a broader global movement toward valuing cultural heritage as a fundamental component of national branding and tourism appeal. Countries like Sweden, Switzerland, Egypt, Israel highlight the presence of the word "museum", showing a focus on places deputed to the enjoyment of cultural assets. Noteworthy is the term "people" present in 7 countries (UK, Canada, USA, Brazil, China, South Korea, South Africa) to denote the relevance of the population, seen not only as the creator but also the beneficiary of the actions and projects aimed at enhancing the nation's cultural capital. Australia and Canada stand out for the use of terms like "aboriginal" and "indigenous" and show a commitment to educating and preserving indigenous stories and cultures. Moreover, in the case of Canada the copresence of words like "reconciliation" and "people" also highlight a specific effort to recognize and respect indigenous communities. Thanks to the multicultural structure of these countries, this result confirms the social value of culture and creative industries (intangible cultural heritage) in contributing to social cohesion. South American countries, like Mexico and Peru, demonstrate a special emphasis on culinary traditions.

3.3 Content analysis

In order to bring out the broader thematic structure underlying the different conceptual categories related to the cultural heritage theme, for each country, the selected texts were coded and an analysis of the words and phrases adjacent to the theme words (high-frequency words) was carried out. The analysis of the texts made it possible to analytically identify the constituent elements of the cultural heritage image, revealing a system of nodes centered on 13 conceptual categories from which it was possible to trace 54 sub-categories, linking coded phrases and paragraphs

and representing the main themes of the corpus. The conceptual subcategories represent a decomposition of the text into homogeneous parts characterized by similarity of subject matter. In-depth analysis of these subnodes enabled the definition of the metatext, synthesizing the original text into meaningful segments that to varying degrees are found in different countries (Table 3). Through a process of abstraction, from the analysis of the subcategories, the main categories were defined. The categories include the characteristic elements of the bidimensional perspective normally associated with the cultural heritage concept. However, results show a move beyond the dyadic nature of the concept to embrace a three-dimensional one in which there is also an emphasis on aspects more closely related to the population and the national identity. Therefore, these dimensions include tangible cultural heritage, intangible cultural heritage, and national identity, highlighting the deep interconnection between cultural elements and the collective identity of a nation.

Tab. 2: The 10 most frequent words by country

Europe	1	2	3	4	5	6	7	8	9	10
France	Heritage	Culture	Cultural	National	Ministry	Tourism	Public	Architecture	Monuments	Directorate
Germany	Foundation	Cultural	Heritage	World	Unesco	Intangible	Sites	Convention	Inscribed	International
Italy	Historical	Tourism	Heritage	Cultural	National	Law	Places	Activities	Artistic	Assets
Sweden	Castle	Language	Palace	Jewish	Museum	Arts	Culture	Government	Force	Century
Switzerland	Art	Film	Works	Museum	Dance	World	Include	Theatre	International	Design
UK	Heritage	Historic	Creative	National	People	Places	Local	Culture	Future	Support
North America										
Canada	Indigenous	Heritage	Tourism	Parks	Industry	Reconciliation	Work	Partners	People	Council
Mexico	City	State	Cultural	Cuisine	Culture	World	Natural	Tourist	Towns	One
USA	Arts	Cultural	Tourism	National	Travel	Communities	People	Strategy	Support	Organizations
South America										
Argentine	City	One	Country	Shows	South	World	Cultural	Culture	Football	History
Brazil	Country	People	World	Brand	Home	Nature	New	Cultural	Destinations	History
Peru	World	Grow	Latin	Sector	First	Economy	Gastronomy	Picchu	Country	Inca
Asia										
China	People	Day	Festival	Groups	National	Republic	Years	Area	Ethnic	One
Japan	Cultural	Properties	Arts	Culture	Travel	International	Information	Tourism	National	Local
South Korea	Heritage	Cultural	National	People	Designated	KHS*	Music	Country	Sea	Historic
Africa										
Egypt	World	Cairo	Seas	Museum	Desert	City	Temple	Prorectorate	Waters	Nature
Morocco	Culture	Heritage	City	Modern	Nature	Districts	Marrakech	Lively	Medina	Traditions
South Africa	Heritage	National	Cultural	Act	Resources	Tourism	Nation	People	Brand	Culture
Middle East										
Israel	Museum	Jewish	Center	First	Land	State	Water	Archaelogical	City	Historic
Qatar	Culture	Author	Ministry	Palestine	Design	Century	Gulf	Heritage	World	Cultural
UAE	Art	Arab	Culture	World	Intangible	Public	Centre	Countries	Traditions	Human
Oceania										
Australia	Aboriginal	Arts	Capital	New	Indigenous	Cultural	Islander	First	Government	Music
New Zealand	Heritage	Tourism	Wāhi	Visitors	Māori	Tapu	Cultural	Historic	International	Culture
Vanuatu	Local	Events	Islands	Markets	Music	Mata	Drawings	Sand	Chief	Arts

Notes: * KHS (Korea Heritage Services).

Source: Authors' elaboration.

3.3.1 The tangible cultural heritage

With reference to the tangible aspects, we find that historic sites, natural environment and cultural institutions define the tangible presence of the cultural heritage. These categories show that different countries attach considerable importance to tangible components because of their recognisability and their ability to become powerful conveyors of the country's cultural identity. Tangible heritage offers stability, historical connection and authenticity, providing the public, both domestic and

foreign, with concrete elements through which to interpret the country's cultural narrative. Recurring references to cultural heritage also denote a view of material culture as a reliable, effective and understandable vehicle. At the same time, the classification of tangible heritage (historical-architectural heritage vs. natural heritage) highlights the polysemic structure of cultural heritage. Tangible assets do not represent a monolithic category but rather encompass multiple levels of meaning: some linked to historical architectural components, others to the characteristics of cultural institutions, and still others to symbolic identity formations rooted in the landscape imagery. Following this reasoning, results show that, alongside natural resources and historical sites, cultural institutions hold immense importance. The former are considered tangible expressions of the country's historic, artistic and natural heritage, while the latter are indispensable venues for transmitting the country's history to future generations. This distinction aligns with the dynamic view of cultural heritage, wherein the creation and vitality of cultural assets are increasingly important, alongside their safeguarding and transmission. Moreover, cultural institutions often serve a dual role: not only do they facilitate access to and enjoyment of cultural assets, but, when they possess significant history and longevity, they themselves become cultural-historical landmarks. And we refer specifically to museums, which in fact appear to be the most relevant textual category.

An eloquent example from Japan's communication highlights this: "As core institutions involved in the preservation and transmission of history and traditional culture, each museum collects objects according to its own individual collection policy to ensure that its collection is systematically and historically balanced".

In terms of tangible elements, some countries highlight the significance of landscapes and natural scenery, recognizing them not only as essential components of tourist destination image but also as vital factors enhancing the quality of life within the natural and historical environment.

3.3.2 The value of the intangible cultural heritage

With respect to the intangible macro-dimension, the conceptual framework surrounding the intangible aspects of cultural heritage is considerably more complex in line with the recent approach of the "living heritage" proposed by several scholars (Lenzerini, 2011; Poulios, 2014), which underscores the importance of intangible assets for the survival and transmission of a community's distinctive traditions, skills, and qualities.

The key innovation in defining heritage does not stem from distinguishing between tangible and intangible categories but rather from a gradual shift in perspective, from viewing cultural expressions as static objects to understanding them as dynamic cultural processes (Bortolotto, 2006). Categories four to eleven (Tab. 3) can be associated with the intangible cultural heritage, namely: craftsmanship, visual arts and audio-visuals, performing arts, literature, language, gastronomy, traditions, sports. The first category is craftsmanship. Surprisingly, this dimension doesn't show a relevant presence within the corpus. However, references

highlight that craft techniques are seen as valuable qualities that signal the work and creativity of the local community. Next two categories are related to creative industries, namely visual arts and audio-visuals, and performing arts. The first category includes a diverse array of artistic expressions, ranging from sculptures and paintings, enduring testaments to artistic history, to contemporary films and video productions, which convey narratives across time and space, preserving cultural identity in universally accessible formats beyond linguistic and geographical boundaries. Among its subcategories, architecture and design, as well as film heritage and production, receive the highest number of references, underscoring their significant role in shaping a nation's cultural identity.

The second category, performing arts, holds a crucial place in a country's cultural communication, as its evocative and persuasive nature offers a unique gateway to understanding and experiencing national identity. Music, dance and theater are the main artistic expressions that emerged from the analysis and appear to be fundamental as they are deeply connected to the country's cultural identity by being able to pass on its stories and values. This is clearly demonstrated in the descriptions provided by some countries, such as Australia, which emphasizes: "Artistic expression, whether painting, dance, song or story, is integrally connected to cultural knowledge and relationships with a person's country, be it land or sea". The seventh category is "literature". Poetry and other literary works seem to be another pertinent conceptual category that can explain the "true essence" of the national identity that has to be communicated internationally. Furthermore, nations that place a strong emphasis on national literature in their communications offer comprehensive details on the most well-known poets and authors, demonstrating a sense of pride in their country's literary achievements and authors.

The linguistic component is closely related to the literature dimension. Language is the eighth category. Some nations appear to respect their native languages more than others, either because of their universal appeal, extensive use abroad, or long-term preservation. It's interesting to note that Sweden and Australia likewise place a strong emphasis on the existence of linguistic diversity and language communities, as well as the protection that follows. Gastronomy represents the ninth category. Remarkably, the corpus does not demonstrate how important this theme is to cultural transmission. However, Latin American countries are those that emphasize the role of local gastronomy also as a driver of tourism development, for example: "The Peruvian gastronomy is divided in zones or regions, each with typical gastronomy, becoming in a special gastronomic destination" (Peru). "Traditions" is the tenth conceptual category. Folklore (festivals, celebrations) is identified as a recurrent theme in the analysis. These events are seen as a valued cultural expression of local communities to the extent that they have become a distinguishing emblem. The last category of the intangible cultural heritage is "sport". Sports activities are associated with the development of the country as a tourist destination and also with the discovery of the country's natural and scenic heritage, for example: "Our wide range of sporting events will keep everyone entertained with adrenaline pumping action from marathons and round island relays to

open water swims, rowing competitions" (Vanuatu). In some cases, then, the nation promotes sports to support social cohesion especially for the younger generation, for example: "To provide an enabling environment for the sport, arts and culture sector to foster an active, creative, winning and socially cohesive nation" (South Africa).

3.3.3 The role of national identity

Finally, the last two categories, "People" and "Diversity, equity & inclusion", refer to the essence of the country in terms of local communities, diversity and equity. Regarding the first aspect, countries seem to leverage on population traits to emphasize the national identity of the country and to let emerge the warm and friendly nature of its citizens. Specifically, these aspects are judged crucial when presenting the tourist vocation of the country. For example, the Egypt communication states: "Friendliness and smiles are infectious in Siwa, Egypt's most remote desert oasis". At the same time, this category is used and promoted to signal the vital bond between cultural heritage and local communities from two perspective. On the one hand, the population is considered the living part of cultural heritage, the actual creator; on the other hand, nations are committed to ensuring that cultural heritage is accessible and usable in various forms to the population as the lifeblood of progress and development. As a result, the communication style becomes more emotive and adopts national storytelling methods through which the nation presents itself, therefore highlighting its real identity and hoping to transmit it outside free from distortions. This aspect is also connected to the next conceptual category: diversity, equity, and inclusion. Diversity promotes the fusion of traditions, languages, and artistic practices, enriching a nation's cultural heritage and making it more dynamic and representative of a wide range of experiences. Countries recognize the value of the diversity that characterizes them - whether linguistic, demographic, or cultural - and the need to protect and enhance it.

The meeting of diverse perspectives stimulates innovation in areas such as art, literature, and music, giving rise to new cultural expressions and fostering social progress. For example, Canada's communication states: "We believe that Canada's diversity, its greatest asset, is also, what touches travellers' hearts most deeply. To that end, we are committed to inclusive leadership within our workforce, workplace, and interactions with partners and travellers alike". Inclusion, instead, allows the histories and experiences of all communities to be recognized and valued, preventing the marginalization of minority groups and ensuring a more complete and true-to-life historical narrative. An inclusive society fosters mutual respect and cohesion among diverse groups, promoting a sense of common belonging that enhances the stability and well-being of the nation. Inclusion ensures that everyone could contribute to the national culture, overcoming discrimination and barriers that might limit talent and participation. A country, that values diversity and inclusion, presents itself as a strong cultural player on the international stage, fostering intercultural dialogue and improving its image in the world.

Tab. 3: Conceptual categories and sub-categories of the cultural heritage image communicated by the countries

Cultural heritage macro-dimensions	Conceptual categories	Sub-conceptual categories	No. of countries	No. of references	Main references
Tangible cultural heritage	(1) Historic sites	Monuments	11	75	It contributes to the policy of safeguarding and enhancing monuments and sites likely to be listed or already classified as Historic Monuments for their historical, aesthetic or cultural interest (France). The Government of Canada's objective is to preserve its built heritage Federal built heritage comprises the places, buildings and monuments that have been recognized as having heritage value.
		Historic buildings	6	18	English Heritage cares for over 400 historic buildings, monuments and sites - from world-famous prehistoric sites to grand medieval castles, from Roman forts on the edges of the empire to a Cold War bunker (UK).
		Historic sites	7	21	We protect an internationally important collection of historic sites and artefacts which span six millennia, from the ancient past to the present day and include palaces, houses, hill figures, castles, abbeys, industrial sites, Roman forts and even deserted medieval villages (UK). National historic sites have a separate designation process under the Historic Sites and Monuments Act (Canada).
		Churches and religious buildings	6	105	Stories are wrapped up in a building; its use, adaptation, and renewal of sacred spaces over centuries of social, economic and cultural change make historic churches exciting places to visit (UK). The palace is a piece of art in itself – and so too is its resident place of worship, the Royal Chapel (Sweden). The widening of the definition of heritage towards key achievements of the twentieth century (industrial heritage, works of art, housing, public and religious buildings, tourist and sports facilities) (France).
	(2) Cultural institutions	Museums	19	323	There is virtually no other country on earth with as many museums per head of the population as Switzerland (Switzerland). The program increases access to arts and cultural experiences for audiences outside major cities and encourages partnerships between museums and galleries across the collections sector (Australia). As core institutions involved in the preservation and transmission of history and traditional culture, each museum collects objects according to its own individual collection policy to ensure that its collection is systematically and historically balanced (Japan).
		Collections	12	169	Switzerland is a country of collectors. A major part in the art market has long been played by the great industrial families, some of whom assembled important collections. Examples include the collections of Oskar Reinhart in Winterthur and Emmanuel Hoffmann in Basel (Switzerland). St Catherine Monastery in Sinai is Home to the famous "burning bush" and some of the most renowned collections of religious documents and icons in the world (Egypt).
		Archives	11	45	The Directorate-General for Heritage and Architecture defines, coordinates and evaluates the State's action in the conservation, communication and enhancement of public archives (France).
		Libraries	14	59	The Swedish Arts Council is a government agency founded in 1974. We support arts and culture in many different forms – literature, museums, libraries, performing arts, music, reading promotion, arts, culture in schools, crafts etc (Sweden).
		Art galleries	9	56	We also strive to exchange information with and provide specialist/technical guidance and advice to other museums and galleries within Japan and overseas (Japan). There are also numerous galleries and auctions as well as international and regional fairs to delight the hearts of art enthusiasts from all over the world (Switzerland)
		Exhibitions	12	110	The latest round of the Visions of Australia program is now open with up to $1 million in funding available to assist quality exhibitions tour the country (Australia).
	(3) Natural environment	National parks and gardens	17	249	Our main activity is to take care of the special places that we have received as donations, inheritances or that have been granted to us in management: woods and coasts, parks and gardens, castles and historical residences, villas and abbeys, but also small assets with a high identity value such as a historical shrine or the old barber's shop in the city (Italy). With a multitude of gardens and parks throughout the emirates, it is sure to have something for everyone (UAE)
		Landscapes	18	112	This dynamic has been driven by European visitors, the first to return to France, to discover or rediscover its art of living, its culture, its many landscapes but also a renewed offer, responding to their growing aspirations in terms of sustainable tourism (France).
		Sea and coasts	16	160	Tourism Australia acknowledges the Traditional Aboriginal and Torres Strait Islander Owners of the land, sea and waters of the Australian continent, and recognises their custodianship of culture and Country for over 60,000 years (Australia).
		Lakes	10	58	Views from the top include the nearby lakes and dunes, and it's also a great place to spot some rare eagles or falcons (Egypt). This heritage includes large numbers of coastal fish traps, submerged prehistoric landscapes, rock paintings, and archaeology associated with inland waters such as lakes and rivers (South Africa).
		Ecosystems and biodiversity	8	30	The knowledge generated by scientists and supporting staff within the division and in collaboration with external associates informs park management and promotes the conservation of biodiversity, landscapes and associated heritage assets (South Africa).

Intangible cultural heritage	(4) Craftmanship	Artisans	2	3	The Local Festivals component provides funding to local groups for recurring festivals that present the work of local artists, local artisans, local heritage performers, and local cultural carriers (Canada).
		Craft techniques	1	2	In Japan, "Intangible Cultural Properties" refers to stage arts, music, craft techniques, and other intangible cultural assets that possess high historic or artistic value for the country (Japan).
		Handicrafts	2	4	Endeavouring to inspire professionals and enthusiasts in arts, literature and music locally and internationally, we also work to preserve traditional artistic practices and handicrafts (UAE).
	(5) Visual arts and audio-visuals	Sculptures	9	29	There are two stone galleries to explore within the exhibition hall. The sculptures and busts are displayed in the exact same spots they were placed in the 1790s. Each sculpture is a thing of beauty, but Endymion – created by the artist of the same name – is considered the standout piece (Sweden).
		Drawings	7	25	The museum in Berne therefore has the world's largest and most important collection of paintings, water-colours and drawings by this artist, whose works can be assigned to many movements: expressionism, constructivism, cubism, primitivism and even surrealism (Switzerland).
		Paintings	11	35	Many of the paintings, including centuries-old portraits of kings and queens, hang in the gallery within the beautiful Bernadotte Apartments (Sweden).
		Architecture and design	10	185	America's historic sites are irreplaceable. From icons of architecture to birthplaces of activists, historic sites are physical reminders of the diversity of our experiences and the history we share (USA).
		Photography	11	91	ENIT's Historical Archive relates to the activities of the Italian National Tourism Board from 1919 – the year of its foundation – to the present day and consists of about 4,000 ML documents and over 200,000 images including slides, photographs, negatives, videos and historical poster (Italy).
		Architects	7	62	From the early 20th century onwards, this country has produced several daring and visionary architects who have achieved global renown (Switzerland).
		Film heritage and production	12	165	The Swiss film scene is flourishing as never before: measured by market share and cinema tickets bought, 2013 was the most successful year for the Swiss cinema since 2006, the year when "Late Bloomers" was such a hit (Switzerland). Australia is a popular and world-class destination for filmmaking because of our lifestyle and spectacular and diverse locations (Australia).
	(6) Performing arts	Music	15	172	Switzerland is brimming over with music, with the largest number of music festivals by area of any European country – and the dance scene is equally impressive (Switzerland). Music surrounds our islands like the ocean celebrating a fantastic range of outdoor music concerts happening every year from January to December (Vanuatu).
		Performances	13	48	U.S. department of arts and culture contributes to the strength and vibrancy of the movement for collective liberation by resourcing and mobilizing cultural organizers and artists. We do this through political education, connecting cultural organizers and movement, policy engagement and play and performance (USA).
		Dance and ballet	13	142	Artistic expression, whether painting, dance, song or story, is integrally connected to cultural knowledge and relationships with a person's country, be it land or sea (Australia). Fishing, hunting and traditional lore are central to Torres Strait Island culture and are reflected through ceremony, song, dance and spirituality (South Africa).
		Concerts	6	17	The House of Electronic Arts focuses on the conservation, archiving and documentation of digital art. Its exhibitions, concerts, lectures, guided tours and workshops address an extensive public (Switzerland). concerts and festivals are held at heritage sites and on the grounds of historic houses - from Ragley Hall, Kenwood House and Audley End to Hampton Court and Windsor Great Park21(UK).
		Theatre	12	106	Furthermore, the National Theatre conducts training workshops and other activities to train the respective successors of traditional performing arts, such as Nohgaku, Bunraku (puppet theater), Kabuki, and traditional popular entertainment (Japan).
		Musicians and composers	8	40	Lyrics sung by Swiss pop musicians and rock bands are more often in English nowadays, otherwise no honours or money are to be had at international level (Switzerland).
	(7) Literature	Literature	7	52	Australian literature is vital to our cultural and intellectual life and communicating Australian stories (Australia).
		Writers	7	38	Max Frisch (1911–1991) is known as one of Switzerland's greatest writers (Switzerland).
		Poetry	4	17	We are a nation of dream-weavers; we make music, art, architecture, poetry, pottery and plays (UK).
		Poets	4	19	Snow-covered eucalypts, huts in mountain settings and mountain landscapes are distinctive Australian images captured by numerous artists and photographers. The mountain landscapes have inspired poets, writers, musicians and film makers (Australia).
	(8) Language	Language	17	147	The ILA supports First Nations Australians to express, conserve and maintain their cultures through languages and arts activities (Australia). Romansh literature has been in existence since the 16th century. This language is written in several dialect forms. Romansh is the fourth official national language of Switzerland (Switzerland).
		Dialect	4	34	Dialects, poems and stories that express the history of the Emirate (UAE). People in the German-speaking region of Switzerland speak various Alemannic dialects such as Baseldeutsch, Berndeutsch, Bündnerdeutsch, St.-Galler-Deutsch, Walliserdeutsch and Zürichdeutsch (Switzerland).
		Language diversity	2	2	The Act is also intended to protect the Swedish language and language diversity in Sweden, and the individual's access to language (Sweden).
		Language groups	2	4	The Torres Strait is divided into two language groups: Mirriam Mer is the dominant language in the eastern Torres Strait and originates from Papua New Guinean influence (Australia). This rich and dynamic graphic tradition has developed as a means of communication among the members of some 80 different language groups inhabiting the central and northern islands of Vanuatu (Vanuatu).
	(9) Gastronomy	Food products	16	49	Australia's success as a destination has been built on the combination of our world class natural beauty and unique wildlife as well as our welcoming people and exceptional food and wine (Australia)
		Local gastronomy	4	11	In major cultural expressions, in rhythms and dances, in gastronomy, in visual arts, in architecture, in religiosity and in the construction of our history, the historical influence of the black population is present throughout the country (Brazil). The Peruvian gastronomy is divided in zones or regions, each with typical gastronomy, becoming in a special gastronomic destination (Peru).
	(10) Traditions	Festivals	14	128	Our mission is to encourage people to discover the charm of Japanese culture while enjoying programs of cultural content, including art exhibitions, performing arts, and art festivals (Japan).
		Traditions	16	50	The unique culture and traditions shaped by the nature, climate, and people of Japan over centuries can be found in every corner of this island nation (Japan).
		Ceremonies	9	24	The diversity of these assets reflects the breadth of the Australian Government's interests in the National Capital and provides the setting for ceremonies, activities and events that Australians expect to occur in their capital (Australia). Today, hanbok is more often worn for special occasions than as casual clothes, such as wedding ceremonies, children's first birthdays, and seasonal holidays including the Lunar New Year's Day and Chuseok (South Korea).
	(11) Sport	Sport activities and events	12	39	State to support and coordinate their works it was responsible for setting terms and standards for the establishment of clubs, centers, committees and associations for youth and sports and issuing license for them (Qatar). To preserve and maintain this great posture, the government has through its Department of Sports, Arts and Culture, launched programmes to support its people within these creative sectors through their Annual Performance Plan (South Africa).

National identity	(12) People	Community	17	301	Values sit at the center and cultural organizers, community organizations and movements coalesce around participatory decision making, rigor and care (USA).
					It makes the Ministry of Culture a nurturing project committed to the challenges facing the country community by strengthening its national identity (Qatar).
		Friendliness	4	8	Friendliness and smiles are infectious in Siwa, Egypt's most remote desert oasis (Egypt).
					Enjoy every Moroccan product in a friendly atmosphere (Morocco).
		Opportunities	15	117	Together, the Arts Endowment's activities support bringing meaningful arts experiences to all Americans, helping to ensure that everyone in the country has the opportunity to live artful lives (USA).
					The Visions of Australia program promotes the National Cultural Policy, Revive, by providing opportunities for audiences across the country to engage with our vibrant arts and culture landscape (Australia).
		Identity	7	132	Our main activity is to take care of the special places that we have received as donations, inheritances or that have been granted to us in management: woods and coasts, parks and gardens, castles and historical residences, villas and abbeys, but also small assets with a high identity value such as a historical shrine or the old barber's shop in the city (Italy)
		Minorities	3	11	The Ministry of Culture in Sweden is responsible for issues regarding culture, media, democracy, human rights, minorities, national minorities including Sami culture and language (Sweden).
	(13) Diversity, equity and inclusion	Equity and inclusion	2	39	Our mandate from President Biden is clear: we must address the four intersecting challenges of COVID-19, economic recovery, racial equity and climate change. Read our priorities to learn how we will meet the scope of our challenges and the multiple, overlapping crises (USA).
		Diversity	12	58	The Bureau of Educational and Cultural Affairs (ECA) of the United States Department of State strives to embed diversity, equity, inclusion, and accessibility (DEIA) in all aspects of its work (USA)
		Sustainability	10	22	We have identified four major priorities going forwards - Inspiration, Conservation, Involvement and Financial Sustainability (UK). The Strategy also applies a holistic approach to tourism development, including incorporating sustainability- and community-based development and management strategies (USA).
		Disability	2	17	ECA is committed to addressing barriers based on race, ethnicity, colour, national origin, sex, age, disability, sexual orientation, gender identity or expression, religion, geographic location, education, income, socio-economic status, and other diversity dimensions, that may hinder inclusion in the organization (USA).

Source: Authors' elaboration.

4. Discussion

Over the past decades, the concept of cultural heritage has undergone a profound transformation, driven by the increasing engagement of academic disciplines that have traditionally maintained a peripheral interest in the subject. As previously noted, cultural heritage has experienced a notable semantic evolution, expanding beyond the classical notion of individual artistic "genius" to embrace a more inclusive framework that acknowledges the collective role of communities in defining, safeguarding, and promoting heritage. This democratization of cultural heritage has introduced new analytical dimensions, enriching its conceptual foundations with interdisciplinary insights and novel theoretical perspectives. More significantly, cultural heritage has transcended its conventional role as a mere repository of historical and artistic value, evolving into a strategic asset that contributes to national identity formation, social cohesion, and economic development at both regional and global levels. However, despite the conceptual advancements in the study of cultural heritage, a persistent gap remains between the intricate system of meanings associated with a nation's cultural image and the institutional mechanisms through which these meanings are structured and disseminated. This disjunction is particularly evident in the field of international marketing and nation branding studies (Mainolfi *et al.*, 2024; Napolitano *et al.*, 2015). Although

research on country image has generated a substantial body of literature over the past five decades (Papadopoulos *et al.*, 2018; Heslop *et al.*, 2010; Pappu *et al.*, 2007), it has largely overlooked a systematic analysis of cultural heritage's role in shaping perceptions of international audiences. This oversight is reflected both in the absence of conceptual models that explicitly integrate cultural heritage as a measurable construct and in the limited understanding of how a country's cultural image influences consumer attitudes and decision-making processes.

This study seeks to address this gap by bridging cultural heritage studies and the country image literature. It pursues a dual objective: first, to develop an initial conceptualization of the cultural heritage image as a theoretical domain, and second, to explore the role of cultural elements in the communication strategies employed by advanced nation branding systems. Given the exploratory nature of the research, a grounded methodological approach was adopted, allowing theoretical categories to emerge inductively from empirical analysis of secondary sources selected based on their relevance and originality.

The findings derived from the statistical-lexical analysis of institutional communication materials from twenty-four selected countries provide significant insights into both the diversity of cultural heritage components and the sophistication of communication strategies related to cultural variables. The empirical results confirm the relevance of the intangible components (Unesco, 2003) that incisively connote the discourses and narratives conveyed by countries in official communication. Most interesting is the variety and breadth of thematic cores that emerged ranging from arts to language, from craftsmanship to sports testifying to the multifaceted and fascinating complexity of the phenomenon.

Notably, national identity emerged as a third fundamental component, framed around the characteristics of a country's population and its cultural diversity - both of which are increasingly regarded as integral elements of heritage that warrant preservation and promotion. Across nearly all the countries analyzed, official communication regarding cultural heritage exhibits a complex and multidimensional narrative structure that extends beyond the mere enumeration of tangible cultural assets. The methodological framework adopted in this study facilitated the identification of thirteen key subcategories that underpin the cultural heritage image, encompassing historical-artistic sites, cultural institutions, natural environment, craftsmanship, visual arts and audio-visuals, performing arts, literature, language, gastronomy, traditions, sport, people, diversity, equity and inclusion.

These findings underscore the increasing integration of cultural heritage into national branding efforts and highlight the necessity for more nuanced theoretical and empirical frameworks to capture its impact on international perceptions. Specifically, the study contributes to an advancement of knowledge of the country image construct by delving into the role of cultural heritage in shaping the perceptions boasted toward a country. This result is extremely relevant as it systematizes the interpretive boundaries of the cultural heritage dimensions and draws a line of inquiry for the proposal of a measurement scale for the cultural heritage image.

5. Implications

5.1 Theoretical implications

The results of this study contribute to the academic debate on country image and cultural heritage by attempting to fill an obvious scientific gap concerning the decline in the value of the cultural component in the process of forming a country's image, through a conceptually based categorisation of communication themes relating to heritage. Firstly, the conceptual categories identified enrich current interpretative models on cultural heritage by highlighting, through empirical research, the dynamism and elasticity of the concept of cultural heritage. Furthermore, through its analytical approach, the study seeks to bridge the missing link between the image of a country and the image of its cultural heritage by questioning the narrative symbolism and contemporary reinterpretation of the fundamental elements of what can be considered cultural heritage today.

Secondly, the analysis advances theoretical understanding by demonstrating that the image of cultural heritage is not only a static reflection of historical assets, but a dynamic communicative construction shaped through digital dissemination and narrative framing. This highlights the importance of considering communicative intentionality and digital rhetoric as clear evidence of a country's self-perception of identity. Third, this study highlights the theoretical significance of cultural heritage as a semiotic asset in the construction of national narratives. By examining the structures and content used in official digital communication, the research reveals how narratives about heritage represent symbolic vectors of collective identity and projected national self-awareness. This offers a conceptual bridge between studies on country image and broader theories of collective memory and national identity construction. From here, the results suggest that country image models should consider not only the informational content related to heritage, but also the symbolic and ideological traits inherent in heritage narratives. Hence, the results suggest that current country communication requires a more "modern" interpretative theoretical model capable of reading and interpreting the new compositions and directions of the cultural heritage image in order not only to reconnect with the overall image of the country but also to aim at modules for measuring the value of heritage. This perspective encourages future research to integrate heritage-based dimensions into multilevel models of soft power, consumer behaviour, and cultural diplomacy.

As for the contribution and originality of this research, it is, to the best of the authors' knowledge, one of the first studies to integrate the concept of cultural heritage in the context of international marketing, with the aim of identifying a conceptual framework suitable for representing the multiplicity of contents and images evoked by national cultural heritage. Given the limited attention given to this topic to date, the results obtained warrant a more in-depth analysis of the perceptual modes of cultural heritage image and the related enhancement strategies adopted by both public institutions and businesses (Moilanen and Rainisto, 2009).

5.2 Managerial and policy implications

From a managerial perspective, the use of cultural heritage as a strategic marketing lever is becoming increasingly relevant, especially for companies belonging to nations with a rich and globally recognized historical heritage. In particular, companies that embody national brands that are considered "prototypical" can capitalize on the image of their country's cultural heritage to build a distinctive set of associations that uniquely connect national identity with local products (Anholt, 2002; Banerjee, 2008). A thorough understanding of the constituent dimensions of cultural heritage image also proves essential for policymakers who aim to increase their nation's international attractiveness and align promotional strategies with a unique repertoire of tangible and intangible associations. Prominent cultural emblems, such as the Eiffel Tower, Italian gastronomy, and Shakespeare's literary corpus, are not merely "cultural assets," but convey symbolic meanings that serve as conceptual aggregators for different categories of products and services, thus consolidating national branding strategies (Kavaratzis and Ashworth, 2015).

The results provide concrete guidance for tourism agencies, cultural institutions, and national authorities responsible for place branding. The categories identified can be used as strategic levers to define more coherent heritage communication strategies, for example by prioritising authentic cultural narratives over generic promotional messages, or by integrating community-based storytelling to strengthen the perceived legitimacy and emotional relevance of heritage assets.

At a more macro (institutional) level, the findings of the study can support governments and policymakers in defining a holistic strategy that helps identify the "new" branches and possible connections between the constituent dimensions of cultural heritage. In this sense, the value of such an approach may also lie in increasing the likelihood of cross-fertilisation between sectors, such as the cultural, creative and manufacturing industries. Furthermore, a multidimensional view of the phenomenon can help in the development of policies to support sustainable cultural promotion, such as incentivising the digital documentation of cultural heritage practices, supporting local cultural intermediaries or promoting collaborative partnerships between cultural heritage custodians, creative industries and tourism operators.

Finally, this categorization proposal may provide a benchmarking tool that can help countries assess the maturity and consistency of their cultural heritage communication compared to their international counterparts.

6. Limitations and future research

It is necessary to acknowledge certain limitations of the study. First of all, the analysis is based exclusively on web communication and therefore reflects the strategic representations of cultural heritage decided and controlled by official bodies. This choice was motivated by the desire to prioritise communication flows that influence public opinion and fuel the process of consolidating judgements and perceptions of identity makers.

This excludes other areas of communication, such as social media discourse and user-generated content, which could provide a more grassroots perspective on heritage representation.

Secondly, the study examined 24 countries, offering broad geographical coverage but not covering the full potential diversity of cultural heritage communication strategies adopted globally. Some cultural regions may therefore be underrepresented, limiting the generalisability of the conceptual categories identified.

Starting from these limitations, future lines of research can be identified. Future studies could expand on this work in several ways. First, the integration of additional communicative sources, such as social media discourse, user-generated images, and digital storytelling by local communities, would allow researchers to capture grassroots representations of cultural heritage alongside official narratives.

Second, broadening the geographical scope to include, for example, countries from underrepresented cultural regions would strengthen the generalisability and robustness of the identified heritage categories. Comparative studies between cultural clusters could enrich the interpretation of communicative strategies at the national level. Third, future studies could validate the conceptual categories identified in this study through the consumer perspective by developing a transnational measurement scale similar to those commonly used in country image studies. Such an approach would not only allow for a more rigorous comparison of cultural heritage images across different nations but also allow for a deeper understanding of the role it plays in foreign consumers' perceptions of national productions. The results of this survey would be particularly useful for companies and territories where the image of national cultural heritage, particularly in its intangible and identity components, is a strategic competitive advantage in international markets (Dinnie, 2015).

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Scoring environmental social governance ability: a model of sustainability assessment in the blue economy[1][2]

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Abstract

Frame of the research. *Environmental, social and governance (ESG) scores primarily evaluate sustainability performance but fail to incorporate firms' strategic orientation towards sustainability. This limits the understanding of the key drivers behind successful ESG transitions within the blue economy.*

Purpose of the paper. *This study aims to develop and test the ESG Ability Score, a novel measurement model that assesses both ESG performance and sustainability orientation, offering a holistic evaluation of firms' sustainability responsiveness in the blue economy.*

Methodology. *The ESG Ability Score is developed through content analysis of sustainability reports of 22 Italian shipyards and shippers. It is based on the ESG score, quantified using a machine-learning web application, and the Sustainability Orientation Index (SOI), determined by the inclusion of ESG content in the corporate identity and strategic direction.*

Results. *Neither industry reaches low ESG ability, but a greater number of shipyards exhibit medium-high levels of ESG ability compared to shippers, with shipbuilders outperforming shippers in the SOI overall.*

Research limitations. *This study is limited to Italian firms and relies on secondary data. ESG Ability Score should be validated across different geographical and industry settings.*

Managerial implications. *The ESG Ability Score acts as a diagnostic and strategic tool to identify sustainability gaps, align strategies with ESG goals and support informed decision-making.*

Originality of the paper. *A robust methodological framework is proposed for developing an ESG Ability Score. It uniquely integrates sustainability orientation with ESG performance to comprehensively evaluate the sustainability approaches of maritime firms.*

Key words: *ESG score; sustainability orientation; ESG Ability score; shipbuilding; shipping firms; blue economy*

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1. Introduction

The blue economy includes activities focused on the extraction and use of ocean resources, along with the use of coastal and marine areas for industrial and recreational purposes. It is of significant interest in global economic growth for both developed and developing countries, as well as being a strategic sector for achieving sustainability goals within the European Union (European Commission, 2024). The blue economy encompasses not only established industries - such as maritime transport, shipping, fisheries, and tourism - but also rapidly growing sectors that focus on deep-sea mineral mining, ocean renewable energy, offshore aquaculture and blue biotechnology, driven by research and innovation (KPMG, 2021).

The blue economy will face three main challenges in the coming years: global competition, innovation, and sustainability (Martínez-Vázquez *et al.*, 2021). Long-lasting stresses exerted by human activities on the aquatic environment have led to acidification, pollution, ocean warming, the collapse of fisheries, loss of marine species, destruction of breeding grounds, and ecosystem instability. This issue requires an urgent response, as the negative effects will have long-term implications for the planet's health (Agarwala, 2025). Sustainability is thus central to the blue economy, which signifies a paradigm shift away from solely extractive and exploitative methods. A truly sustainable blue economy aspires to achieve "effective protection, sustainable production, and equitable prosperity" in ocean-related activities (Stuchtey *et al.*, 2020, p. 83).

Proper management strategies must be implemented to achieve a sustainable blue economy (Elegbede *et al.*, 2023). In this ongoing transition towards sustainability, environmental, social and governance (ESG) pillars significantly affect the maritime sector's activities (Koilo, 2019; Nõmmela and Kõrbe Kaare, 2022). There is also a significant emphasis on ESG criteria, which have emerged as central components for assessing corporate sustainability and social responsibility.

Existing ESG scores focus on measuring the performance of implemented ESG actions, while neglecting aspects such as the orientation of the management team towards incorporating ESG factors into corporate strategy. However, the integration of ESG into business strategy should not be seen as a mere compliance mechanism but rather as a dynamic input-transformation-output process, where resources are strategically optimised to drive sustainability (Dong *et al.*, 2025). This narrow focus results in inconsistencies and hinders the development of a reliable knowledge base. Indeed, while existing research has predominantly examined the most visible aspects of ESG implementation, it is the underlying, less visible processes - such as strategic decision-making, organisational alignment, and cultural integration - that shape and give meaning to ESG initiatives. Addressing these foundational elements is therefore critical, particularly when ESG outcomes deviate from expectations. Currently, the literature lacks a unified methodological framework to assess both performance (measured outcomes) and strategic orientation (management's proactive engagement), despite their combined influence on effective sustainability

management. This gap limits a comprehensive understanding of the key drivers behind successful ESG transitions.

With this background, the present study aims to design, construct, and evaluate a unified and tailormade tool to comprehensively assess the sustainability approach in the blue economy. It thus seeks to address the following research question (RQ):

RQ: *How can a measurement model be developed to integrate sustainability orientation and ESG performance when evaluating the responsiveness of maritime firms to sustainability?*

To answer this question, we introduce the concept of ESG ability (which integrates orientation and performance) by proposing a specific score for its measurement. To operationalise this concept, we propose the ESG Ability Score, a tailored composite measurement tool that assesses both the strategic intent behind ESG adoption and its measurable impact. The ESG Ability Score is composed of two main components. The first component is the ESG score as determined using a web application (http://www.sustainableentrepreneurship.org/) developed by Mansouri and Momtaz (2022), which employs a machine learning approach. The second component is the Sustainability Orientation Index (SOI), which is based on the inclusion of ESG content in corporate identity - such as vision, mission, and values - and in strategic direction, reflected in the company's goals. The ESG Ability Score, as designed, provides a dynamic and multidimensional evaluation, enabling a more accurate understanding of how maritime firms internalise, implement, and sustain ESG principles.

The score is tested on a sample of 22 Italian firms in the shipbuilding and shipping (i.e. maritime transport) industries. They are known for being heavy polluting and both energy- and material intensive industries (Önal *et al.*, 2021; Zhou *et al.*, 2023). In particular, most shipyards are located near urban areas, thereby affecting the sustainability of cities and society with a significant environmental footprint (Vakili *et al.*, 2022). Likewise, the shipping industry is responsible for a significant portion of air pollutants and impacts on marine environments through harmful aquatic organisms in ballast water, oil spills, and ship recycling (Felício *et al.*, 2021). As a result, these industries are embracing sustainability in two crucial ways. On the one hand, they are innovating in vessel design and construction, adopting advanced and clean technologies, enhancing eco-friendly products and services, and decarbonising transportation (Salas and Arenas, 2024); on the other hand, they are optimising cargo loading and transportation distance through slow-steaming and speed limitations, which are options for ship operators (Tran *et al.*, 2020).

The proposed approach is distinguished by its integration of dynamic and measurable parameters of ESG ability applicable across diverse economic contexts. In contrast to existing models, the ESG Ability Score not only evaluates the current positioning of companies in terms of ESG orientation and performance but also identifies critical areas for intervention. This model is particularly relevant for small and medium enterprises (SMEs), as it offers an accessible and adaptable solution to bridge the gap in ESG transitions. Of note is its introduction of a holistic perspective, which emphasises the interplay between organisational orientation and the

achievement of measurable impacts, thereby supporting sustainable transitions at scale.

The remainder of the paper is structured as follows: Section 2 reviews the relevant literature. Section 3 presents the methods employed for the model development. Section 4 presents the results of the tool testing. Finally, Section 5 discusses the results and emphasises the contributions to knowledge and industry, as well as the limitations of the study.

2. Theoretical background

2.1 ESG performance through scores

The ESG concept is one modern method for evaluating aspects of a company's sustainability through specific ESG performance indicators (dos Santos and Pereira 2022). ESG scores were initially developed to fulfil investors' need to identify top performers based on three key criteria: environmental concerns, including ecological impact, resource consumption, effects on biodiversity, and waste management; social concerns, encompassing community and supplier impact, working conditions, and other social implications; and governance concerns, related to the organisation's transparency, its relationships with shareholders and the board of directors, executive compensation, and board diversity (Ribando and Bonne, 2010). Nevertheless, ESG scores quickly gained traction by aiding companies in boosting their reputation, easing regulatory pressures on their operations, reducing financial risks, and attracting more investment (Serafeim *et al.*, 2019). In recent years, a growing number of studies has showed that solid ESG performance is also positively related to financial growth (Ftiti *et al.*, 2024). Therefore, businesses are now requested to demonstrate their improved performance in different aspects of ESG.

The need to find a universal metric for ESG performance has led to the development of a vast literature on ESG scores, which has brought to light various issues. The first main issue is the lack of a uniformed framework for reporting, which is currently done on a voluntary basis. In the shipping industry, in particular, the lack of a unified methodological framework has led to the creation of various forms of ESG reports, which attempt to address this gap by incorporating recommendations and initiatives from major international organisations (i.e. the UN Global Compact, UN Sustainable Development Goals [SDGs]), as well as private proposals (i.e. SASB, GRI). Unfortunately, these initiatives often remain generic, with overlapping metrics and a systematic omission of specific parameters. ESG reporting and rating models in the shipping industry also typically adopt approaches from other industries, such as mining, oil, and gas. This practice, however, is broadly "incompatible, inconvenient, and inadequate" (Tsatsaronis *et al.*, 2024, p. 699), given that ESG reporting and implementation constitute a consistent competitive advantage for firms in the blue economy. This advantage is recognised by shareholders and stakeholders alike, fostering innovation and making risk prevention easier (Kannellopulos, 2024).

The lack of an ESG index that could universally apply to and be used to compare the performance of different firms is another limitation found within the literature. When comparing a company's results across multiple indicators, significant discrepancies emerge concerning the measures used, information overload and the manual entry of certain data in the databases, and the lack of coverage for all the measured variables (Kotsantonis and Serafeim, 2019). The priorities for ESG can vary greatly depending on the specifics of an industry and the size of each firm (Dimson *et al.*, 2020) and even internal characteristics of the board of directors (Ma *et al.*, 2025), thus leading to skewed results. Furthermore, the environmental and governance components of ESG scores significantly influence their outcomes, whereas the social indicator tends to have a lesser effect on the final score's value (Escrig-Olmedo *et al.*, 2019). In sum, these aspects limit the scope and representativity of findings based on ESG scores.

Another crucial and often underestimated drawback of existing ESG scores is that they do not help in understanding what lies behind them; in fact, ESG scores represent more than just specific elements (Clément *et al.*, 2023). They are not a holistic measure of a company's ESG performance (Berg *et al.*, 2022) and therefore do not provide a complete representation of the business. The scores are also influenced by the organisational culture, values, orientation to sustainability or corporate social responsibility (CSR), but their ability to capture philosophical concepts will always be questioned (Clément *et al.*, 2022). Thus, the academic focus here could be centred on the development of new and customised methodologies to allow a more accurate measurement of ESG issues.

2.2 Sustainability orientation

Research on corporate sustainability and business orientation has grown significantly since the introduction of the UN SDGs (Di Vaio *et al.*, 2020). The existing literature is therefore rich with diverse concepts addressing social and environmental issues at a strategic level. There is considerable scholarly confusion, however, regarding the conceptualisation of firms' orientation towards sustainable development. The literature on sustainability orientation has framed it as a strategic orientation that represents a firm-level capability encompassing a philosophy, principles, and guidelines that shape the nature and scope of an organisation's

activities and policies (Amankwah-Amoah *et al.*, 2019). Earlier research has recognised sustainability orientation as either a strategic asset of the firm or a dynamic capability that contributes to achieving a competitive edge and enhanced firm performance (Claudy *et al.*, 2016).

In contrast, another stream of scholarship has examined sustainability orientation at an individual level, attributing it to personal values and beliefs (Kuckertz and Wagner, 2010). The lack of a unified conceptualisation of sustainability orientation remains evident in the various terminologies used to describe it. These include sustainable development orientation (Heikkurinen and Bonnedahl, 2013), sustainable orientation (Shou *et al.*, 2019), sustainable management orientation (Seidel *et al.*, 2018), strategic sustainability orientation (Hong *et al.*, 2019), and ESG orientation (Momtaz

and Mansouri, 2022; Li, 2024). The present study places the concept of sustainability orientation under the umbrella term of strategic orientation. Thus, sustainability orientation demonstrates the readiness of a firm to implement sustainability-related initiatives (Tata and Prasad, 2015) that reflect its long-term internal commitment to incorporating ESG concerns into its decision-making processes (Shou *et al.*, 2019).

Previous researchers have also struggled to reach a consensus on the measurement of sustainability orientation due to its multidimensional nature. A recent literature review (Khizar *et al.*, 2022) identified 20 scales/models for measuring sustainability orientation. However, the Kuckertz and Wagner (2010) scale, which pioneered the operationalisation of sustainability orientation in terms of social responsibility and environmental protection, is widely acknowledged and used by scholars in this field (Sung and Park, 2018).

Scholars have focused on the antecedents and outcomes of sustainability orientation. In particular, micro factors (e.g. owner/entrepreneur's personal, psychological, and socio-demographic characteristics) are considered as individual-level antecedents (Eijdenberg, 2019); firm-level internal factors (e.g. resources, strategic management, philosophy, and culture) represent the organisational level antecedents (Obal *et al.*, 2020); and, macro-level contextual and institutional factors (e.g. legislation, economic factors, and environmental conditions) are the environmental-level antecedents (Danso *et al.*, 2020). The literature has generally found a positive impact for the outcomes of sustainability orientation at the individual level in terms of managerial sensemaking, opportunity recognition, green entrepreneurship inclination, and sustainable entrepreneurial intention (Busch *et al.*, 2020).

Sustainability orientation also leads to firm-level outcomes. Its connection to company performance has been thoroughly examined, with significant focus on financial results such as cost reduction and resource efficiency, mitigation of supply chain risks, and enhanced collaboration (Croom *et al.*, 2018). Moreover, sustainability orientation exhibits a positive association with nonfinancial outcomes such as organisational and technological innovation, sustainable procurement and design, and the success of new product development (Zhao *et al.*, 2021). A company's sustainability orientation also positively influences its legitimating behaviour, carbon strategy, and social impact in terms of value generation and community engagement (de Menezes *et al.*, 2021).

2.3 ESG in the blue economy

The maritime industry lacks a sufficient understanding of the CSR activities (Fjørtoft *et al.*, 2020) that typically form the foundational benchmark for evaluating ESG ratings (Clementino and Perkins, 2021). Blue economy companies are nonetheless encouraged to develop and implement management methods and tools to measure ESG performance goals (Egorova *et al.*, 2021). For instance, the Norwegian Shipowners' Association (2021) has published guidelines for ESG reporting in the shipping and offshore industries, offering indicators to assess operational performance. Similarly, dos Santos and Pereira (2022) have proposed a

methodology for quantifying the ESG performance of international ports that incorporates over 20 metrics to evaluate port ESG scores. Despite such progress, many shipyards, particularly small and medium-sized ones, have yet to adopt appropriate ESG measures (Vakili *et al.*, 2021). Scholars have largely overlooked sustainability principles in shipbuilding, and the limited existing studies have primarily taken a one-dimensional perspective (Vakili *et al.*, 2022). Among the three components of ESG, environmental and social ones have garnered the most attention in the literature, driven by numerous regulations from international bodies aimed at protecting the environment, as well as the proximity of ports and maritime services to urban areas (Lee *et al.*, 2019). Nevertheless, governance aspects also demand greater attention as the governance of the maritime industry has undergone significant transformations in recent decades (Nõmmela and Kõrbe Kaare, 2022). There are also other industry-based disparities. In the shipping industry, for example, most leading container shipping companies focus more on disclosing economic or environmental sustainability information, rather than on social sustainability (Vural *et al.*, 2021). Conversely, passenger shipping companies emphasise environmental, social, and philanthropic activities (Greets and Dooms, 2020). Research has also identified gaps in the data, relevance, and comparability within the corporate reporting systems of the shipping industry (Fasoulis and Kurt, 2019; Di Vaio *et al.*, 2021).

3. Method

3.1 Research setting and sample

The Italian maritime sector is crucial to the country's economy, especially in industries such as shipbuilding and shipping. These industries not only play a central role in the blue economy but also drive the growth of other industries, creating a significant economic impact. The Italian shipbuilding and shipping industries contribute substantially to the European maritime economy, accounting for 19% and 8% of added value, respectively, and positioning Italy in third and fourth place (Unioncamere-Tagliacarne, 2024).

Through the AIDA database developed by Bureau Van Dijk, we identified the Italian companies belonging to the maritime industry and the related data used to describe the sample. The research included two filters: the first retained only active companies, while the second included only those companies classified under ATECO 2007 economic activities as 301200 - Construction of recreational and sport boats; 301102 - Shipyards for metal and non-metal constructions (excluding ship seats); 331500 - Repair and maintenance of commercial ships and recreational boats (excluding engines); 501000 - Maritime and coastal passenger transport; and 502000 - Maritime and coastal freight transport. A total of 218 companies, including 154 shipyards and 64 shipping firms, were identified.

3.2 Data collection

Secondary data were collected in December 2024, offering the primary advantages of saving time and accessing a large volume of data that would be challenging to gather independently (Johnston, 2017). data are frequently used to develop models within the field of organisational sustainability (Barletta *et al.*, 2021). More specifically, official documents like sustainability reports were collected from the corporate websites of the sample of firms. Reports were selected based on two inclusion criteria: public accessibility and publication in 2023. By adhering to these criteria, relevant and homogeneous input data were obtained. The application of these criteria to the entire dataset yielded 22 usable documents from the companies shown in Table 1.

Tab. 1: The companies investigated

Shipyards	Shipping firms
1. Sanlorenzo SpA	1. D'Amico Group
2. Cantiere del Pardo SpA	2. Costa SpA
3. Besenzoni SpA	3. Gruppo Caronte & Tourist
4. Ferretti Group	4. Grimaldi SpA
5. Cantiere Rossini	5. Grandi Navi Veloci SpA
6. Amico Group	6. Fratelli Neri SpA
7. Groupe Beneteau Italia	7. Tarros SpA
8. De Wave Group	8. D'Alessio Group
9. The Italian Sea Group	9. Cosiarma SpA (Orserio)
10. Fincantieri	10. Carbonor SpA (Carboflotta)
11. Palumbo SY	11. Britoil Srl

Source: our elaboration

Information from the sustainability reports was integrated and cross-referenced with other reliable sources, including annual reports (specifically management reports), social and integrated reports, and non-financial statements (NFSs) (individual or consolidated NFSs in the case of groups). Additionally, environmental statements, quality and environmental policies, and codes of ethics were reviewed. Furthermore, specialised press and top management magazines, including *Economia del Mare* and *Il Sole 24 Ore,* served as additional sources of data. Triangulation was employed to examine the phenomenon from various perspectives, enrich our understanding of the issue investigated, and assess the convergence of evidence.

3.3 Data analysis

The collected data were analysed through a content analysis, which is a research technique useful for "making replicable and valid inferences from texts to the context of their use" (Krippendorff, 2004, p. 18). It is also recognised as one of the most appropriate methods in sustainability reporting and disclosure research (Duh and Primec, 2024). The content analysis was performed according to a three-step procedure.

The first step involved measuring the ESG performance of the sample firms based on a web application (http://www.sustainableentrepreneurship.org/) that uses a machine learning approach, as proposed by Mansouri and Momtaz (2022), to assess ESG properties in the textual data. This application relies on word counts based on a topic-specific dictionary to construct ESG ratings, thus generating an overall ESG score and individual scores for each pillar from text-based data (e.g. whitepapers, pitch decks, blog posts, social media posts). We uploaded the documents in their entirety to the web application, as the qualitative information to be interpreted was highly heterogeneous and not always present in the standard sections of the analysed reports (Montera and Esposito De Falco, 2024). If the original documents were in Italian, they were translated into English, the language in which the dictionary was created.

The results provided by the web application proved to be too similar and too low to be analysed properly. The ESG scores were therefore amplified using a square root transformation ($n^{0.5}$) to highlight differences while maintaining a fixed distance between values. This is common in the literature to normalise data when all numbers are either in a 0-1 interval or all larger than 1 (Osborne, 2010). Moreover - as the data must be skewed to justify a transformation - a test was carried out to certify a skewness level higher than 0.5. Given that our data respect both parameters, we proceeded with the normalisation process.

The second step focused on the measurement of the sustainability orientation by examining textual data on vision, mission, values, and goals, grouped under corporate identity and strategic direction. We focused on these elements because they are often explicitly documented and articulated by the company, which makes them easier to identify and analyse. This also maintained consistency and comparability with previous research (Du and Primec, 2024; He *et al.*, 2024). We chose, however, to exclude corporate purpose, which, while important for the sustainability approach, can be more abstract and less consistently defined across companies (Esposito De Falco *et al.*, 2024); it often overlaps with other elements like vision and mission, which makes it harder to analyse as a separate entity without redundancy.

To minimise subjectivity in identifying items within the documents, we used a keyword list constructed based on an ESG word list developed by Baier *et al.* (2020). Thus, a manual content analysis was implemented based on a keyword search within the sections of the documents related to the description of the firm and its sustainability strategy. The keyword list was then updated after a first reading session of the reports to integrate missing terms.

To ensure the accuracy and reliability of the content analysis, the reports were analysed separately by two coauthors; the results were then compared and discussed, and a shared coding frame was identified. The latter was further checked by a colleague of the authors, who has expertise in this research field. In his opinion, our coding frame fairly represents the sustainability orientation and therefore our coding frame was considered sufficiently valid (Schreier, 2012). The final coding frame is presented in Table 2.

Tab. 2: Coding frame of the sustainability orientation

Dimensions	Items	Environmental Keywords	Social Keywords	Governance Keywords
Corporate identity	Vision	Climate change, climate mitigation, ecosystem, emissions, biodiversity, water, biofuels, pollution, waste, recycling	Human rights, Labor standards, community relations, health and safety, society, education, employment, diversity, inclusion, equity, minority	Audit and control, board structure, shareholder rights, disclosure and reporting, whistle-blowing, transparency, compliance, remuneration, bribery and corruption, stakeholder engagement, business ethics
	Mission			
	Values			
Strategic direction	Goals			

Source: our elaboration

After the content analysis had been completed, the sustainability orientation of sample firms was measured by developing a specific index called the *Sustainable Orientation Index* (SOI), which was calculated as follows[3]:

$$SOI = \frac{\sum \text{Number of keywords for ESG in each item}}{(\text{Total number of keywords for ESG} \times \text{Total number of items} = 32 \times 4 = 128)}$$

Given the low skewness of the data (0.09), a square root transformation of the SOI data and a consequent normalisation process were not required.

Finally, the third step of the data analysis involved determining the ESG Ability Score, as described below:

$$\textbf{ESG Ability Score} = \frac{\textbf{ESG Score} + \textbf{SOI}}{2}$$

The sum of the ESG Score and SOI was divided by two to keep the final score in scale, as these two indices were already computed within a 0-1 interval. After calculating the ESG Ability Score, it was clustered into grades following dos Santos and Pereira (2022), who graded the ESG scores of international ports. Thus, the grades of the ESG Ability Score

[3] For instance, Carbonor's vision includes 5 keywords from the list for E, 3 keywords from the list for S, and 2 keywords from the list for G, totalling 10 identifiable ESG keywords in the vision statement. The company's mission statement contains 6 keywords from the list for E, 5 keywords from the list for S, and 6 keywords from the list for G, adding up to 17 identifiable ESG keywords in the mission statement. Carbonor's values include 7 keywords from the list for E, 0 keywords from the list of for S, and 2 keywords from the list for G, resulting in 9 identifiable ESG keywords in the values. Lastly, the company's goals contain 7 keywords from the list for E, 6 keywords from the list for S, and 5 keywords from the list for G, making a total of 18 identifiable ESG keywords in the goals. By summing the number of ESG keywords identified in each item (10 keywords for vision + 17 keywords for mission + 9 keywords for values + 18 keywords for goals), we obtained a total of 54 keywords. This total was then divided by 128 to calculate the company's sustainable orientation value of 0.42.

were low ability (<0.25), lower-middle ability (0.25-0.50), upper-middle ability (0.51-0.75), and high ability (0.76-1).

Overall, the ESG Ability Score adds a new dimension to more mainstream ESG scores used in previous studies. Indeed, existing scores - such as Refinitiv, Bloomberg, and Sustainalytics - focus on measuring ex post performance of implemented ESG actions (Stewart, 2024). However, in doing so, they neglect aspects related to the incorporation of ESG-related factors into corporate strategy (Clement *et al.*, 2025). By implementing the SOI into the scoring process, this article moves away from this opposition to instead bridge the gap between orientation and performance.

4. Findings: Testing the ESG Ability Score

The investigated firms showed ESG Ability Scores ranging from lower-middle to high ESG ability, with the latter only reached by Fincantieri. The scores for all companies can be found in Table 3.

Tab. 3: ESG Ability Scores of the sample firms

Shipyards	ESG Ability Score	Ability Level
Sanlorenzo SpA	0.55	Upper-middle
Cantiere del Pardo SpA	0.33	Lower-middle
Besenzoni SpA	0.41	Lower-middle
Ferretti Group	0.55	Upper-middle
Cantiere Rossini	0.31	Lower-middle
Amico Group	0.33	Lower-middle
Groupe Beneteau Italia	0.58	Upper-middle
De Wave Group	0.32	Lower-middle
The Italian Sea Group	0.56	Upper-middle
Fincantieri	0.76	Upper-middle
Palumbo SpA	0.42	Lower-middle
Shippers	ESG Ability Score	
D'Amico Group	0.33	Lower-middle
Costa SpA	0.37	Lower-middle
Gruppo Caronte & Tourist	0.53	Upper-middle
Grimaldi SpA	0.40	Lower-middle
Grandi Navi Veloci SpA	0.31	Lower-middle
Fratelli Neri SpA	0.40	Lower-middle
Tarros SpA	0.38	Lower-middle
D'Alessio Group	0.27	Lower-middle
Cosiarma SpA	0.40	Lower-middle
Carbonor SpA	0.49	Lower-middle
Britoil Srl	0.31	Lower-middle

Source: our elaboration

The scores indicate an overall average level of ESG ability, with most companies being placed in the "lower-middle" bracket. There are a few clear outliers in the shipyards industry, with Fincantieri scoring significantly

higher than all others. The same does not apply to the shipping sector, as Gruppo Caronte & Tourist is the only firm to achieve a score in the "upper-middle" bracket. These results show that there is a basic level of ability in both sectors - with shipbuilders having a slight edge over shippers - although potential room for improvement remains.

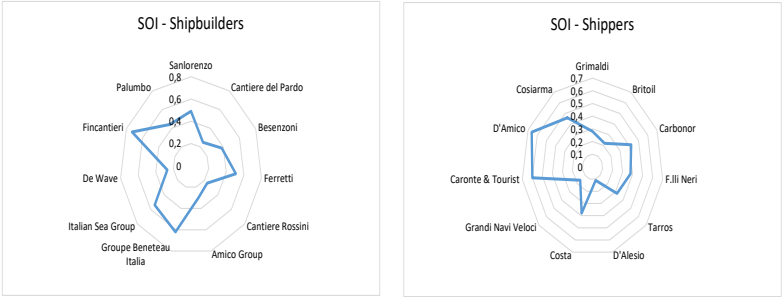
To gather more information, we then analysed the two individual components of the ESG Ability Score. Concerning the specific results of the investigated firms in terms of ESG Score - which are exemplified in Figure 1 - the two groups achieved a similar mean score (49% for shipbuilders and 48% for shippers). The results did not show strong negative outliers for shipbuilders, while Fincantieri was established as a positive example with a score of 78%. The same can be said for shippers, which achieved consistently average scores, with the lowest being 36% and the highest being 66%.

Fig. 1: Firms' ESG Score

Source: our elaboration

The results for the SOI (Fig. 2) showed a more significant gap between shipbuilders - which averaged at 44% - and shippers, with a 36% mean SOI.

Fig. 2: Firms' Sustainability Orientation Index



Source: own elaboration

To provide deeper insight into the composition of the SOI, Table 4 shows the frequency of each keyword, divided into pillars (i.e. environment, social, governance) and items (i.e. vision, mission, values, goals).

Tab. 4: Keywords number by pillars and items

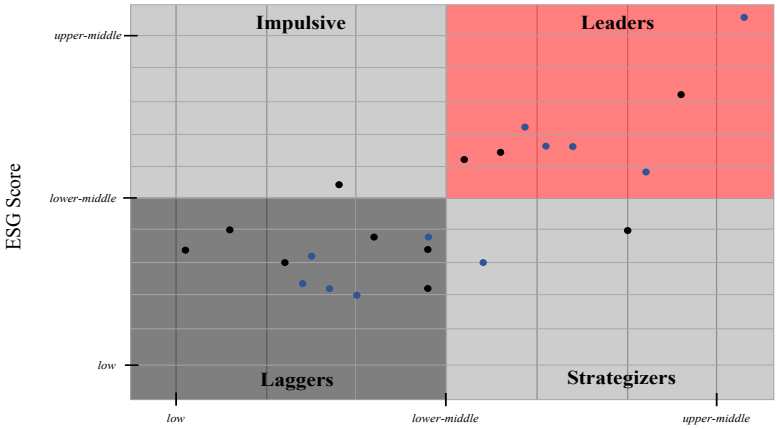
	Shipyards			Shippers		
	Environmental	Social	Governance	Environmental	Social	Governance
Vision	61	47	51	48	46	39
Mission	53	37	50	39	39	31
Values	59	52	57	49	42	37
Goals	53	39	54	60	40	40

Source: our elaboration

The main focus for shipyards is on vision-related keywords, and especially on the E pillar. In particular, keywords such as "emissions", "water", and "pollution" were mentioned more frequently. This outcome might have been influenced by the existing regulations at the national and international level, which tend to focus on these topics. However, the results drop significantly for the S pillar, for both mission and goals. This is true for both groups, potentially showing the limitations in including social elements in their core purpose (mission) and consequently creating a path from orientation to practical outcomes (goals). Moreover, shippers' results for the G pillar for all items are significantly lower than the ones for shipyards.

Finally, a more comprehensive interpretation is provided in a four-quadrant matrix, the Sustainability Navigator Matrix, which illustrates the performance of firms for both the ESG Score (y-axis) and SOI (x-axis) (Fig. 3).

Fig. 3: The Sustainability Navigator Matrix



Legend: blue = shipyards; black = shippers

Source: our elaboration

The matrix makes it possible to cross-reference companies' ESG scores and the SOI, classifying them into four distinct categories: leaders,

laggers, strategisers, and *impulsive*. The upper-right quadrant includes *leaders*, which are characterised by high ESG performance and strong integration of sustainability principles into their strategic identity. This group represents the optimal condition, which suggests that the ability to translate sustainability orientation into concrete and measurable actions is a determining factor in achieving high ESG performance. These companies can serve as benchmarks within the sector and demonstrates best practices in ESG strategy implementation. To maintain their competitive advantage, it is crucial for *leaders* to consolidate their ESG governance structures, enhance transparency in sustainability reporting, and invest in continuous innovation in product and process design to further strengthen their sustainability credentials.

The lower-left quadrant comprises *laggers*, which exhibit low scores in both indicators. This configuration suggests a reactive or marginal approach to sustainability that indicates deficiencies in both the definition of a strategic ESG orientation and its operational implementation. These companies are more exposed to the regulatory and financial risks associated with the sustainability transition, as well as pressures from stakeholders, including investors and customers. Given the increasing scrutiny on ESG compliance, firms in this category should prioritise the progressive integration of ESG principles into corporate decision-making. They should consider developing a structured roadmap to incorporate sustainability into their business processes, while managerial training programmes should focus on raising awareness of ESG-related risks and opportunities. The adoption of ESG performance measurement tools would also enable these companies to identify specific areas for improvement and track progress over time.

The lower-right quadrant, which can be identified as *strategisers*, includes organisations that, despite developing a strong strategic sustainability orientation, have not yet achieved high levels of ESG performance. The presence of firms in this category reflects potential obstacles in the practical implementation of ESG strategies, which may stem from resource constraints, operational inefficiencies, or delays in impact measurement. While these companies demonstrate a commitment to sustainability in their corporate identity, they may struggle to convert this into measurable outcomes. To bridge this gap, they should focus on defining clear ESG key performance indicators (KPIs) that align with their strategic objectives, strengthen collaborations with sustainability-driven stakeholders, and leverage financial incentives to accelerate the transition towards more sustainable practices. By integrating ESG into supply chain processes and adopting technology-driven sustainability solutions, they can enhance their performance and position themselves as emerging leaders in sustainable business transformation.

Finally, the upper-left quadrant, representing the *impulsive* group, consists of a single company with a high ESG Score but a low SOI. This result can be interpreted as indicative of a non-systematic approach to sustainability, where ESG performance is the outcome of isolated interventions or reactive actions to external pressures rather than an organic and structured strategy. Such companies may be exposed to the

risk of misalignment between their ESG profile and their actual capacity to integrate sustainability principles into corporate culture and governance, which increases the likelihood of being perceived as engaging in greenwashing. To mitigate this risk, firms in this category should transition from a tactical to a strategic ESG approach, embedding sustainability into core decision-making processes rather than treating it as an external compliance requirement. A more structured governance framework should be established to ensure that ESG considerations are deeply embedded in corporate strategy, while sustainability initiatives should be designed to generate long-term impact rather than short-term reputational benefits.

The quadrant analysis reveals a distribution in which most firms fall into the *leaders* and *laggers* categories, with a minority belonging to the *strategisers* and *impulsive* groups. The concentration of firms in these two extremes suggests a positive correlation between sustainability orientation and ESG performance, which indicates that companies with low sustainability integration tend to achieve lower ESG results, whereas those with a strong strategic sustainability orientation are more likely to translate this orientation into measurable performance. However, the presence of the *strategisers* group suggests that achieving high ESG performance requires an evolutionary process, where sustainability orientation must be progressively translated into concrete and measurable initiatives through effective governance and structured resource management.

The interpretation of this matrix thus provides a reference model for companies in the maritime and shipbuilding sectors that could help them to identify their positioning and define targeted strategies to enhance their ESG ability. The need for the progressive integration of ESG principles into corporate governance and operational processes emerges as a key element for the sustainability transition, thus emphasising the importance of consistent and long-term strategic approaches. By using this matrix as a diagnostic tool, companies can refine their sustainability strategies, align their ESG commitments with business objectives, and enhance their ability to respond proactively to emerging ESG challenges.

5. Discussion and Conclusion

The blue economy calls for an innovative and cutting-edge ESG scoring system to seamlessly measure and evaluate the ESG performance of companies within a holistic, comparable, and adaptable tool for long-term use. This paper responds to this demand by creating a robust methodological framework for developing an ESG Ability Score designed for companies in the shipbuilding and shipping industries.

Some intriguing pieces of evidence were uncovered by testing the proposed new measurement model. Neither industry investigated reaches low levels of ESG ability, thus demonstrating that the ESG transition has been undertaken, as suggested by other scholars (Vakili *et al.*, 2022), with promising results. However, we observed significant room for improvement in the ESG ability of both shipyards and shippers, especially concerning the governance pillar in the ESG Score, which has also been noted in other

studies in the maritime field (Nõmmela and Kõrbe Kaare, 2022), and the integration of ESG into companies' mission statements. The more frequent incorporation of ESG into corporate values and vision statements can be interpreted as evidence that sustainability is often perceived as aspirational and desirable, particularly in smaller organisations. Moreover, a greater number of shipyards exhibit medium-high levels of ESG ability compared to shippers, with shipbuilders outperforming shippers in the SOI overall. This denotes that the top management's commitment to ESG is propelling the existing efforts "to do good" more than a mere need to comply with national and international regulations, although these, too, are exerting real pressure on the naval sector to be both green and socially responsible in its sourcing, logistics, distribution, and operations practices (Para-González and Mascaraque-Ramírez, 2020).

Our study uncovers key findings that provide a deeper understanding of sustainability approaches within the blue economy. To begin, an organisation's sustainability orientation serves as a significant predictor of its ESG score. This evidence aligns with recent research exploring the various factors influencing ESG performance and identifying those that enhance ESG outcomes (Besley and Persson, 2023). Policies and regulations are no longer the primary drivers of ESG transformation, while intangible "soft assets" - such as corporate culture, shared values, and business philosophy - play a pivotal role in driving performance within the realm of ESG (Clément *et al.*, 2022; Bai *et al.*, 2024). These soft assets, in fact, have the potential to shape strategic directions and behaviours, decision-making processes, and overall organisational performance (Marshall *et al.*, 2015). This implies the significance of deeply embedding ESG principles into the company's culture and identity, potentially resulting in more stable and profound impacts on ESG performance.

Thus, for the first time, a soft asset - such as the organisation's sustainability orientation - is being considered here alongside ESG performance to establish the ESG Ability Score, a novel metric for measuring the responsiveness of maritime firms to sustainability. In essence, ESG ability reflects the organisational capacity to translate sustainability aspirations into measurable, significant impacts. This echoes studies focused on how sustainability can become a capability, enabling an organisation to adapt, change, and innovate towards sustainable paradigms (Schrettle *et al.*, 2014; Leonidou *et al.*, 2015). Such dynamism is inherent in the concept of ESG ability, according to which sustainability should be viewed as an evolving capability rather than a fixed set of sustainable practices. These practices are often static, limited, and may even become obsolete in the competitive landscape of sustainability within the blue economy, especially in the shipping industry (Yuen *et al.*, 2019).

Thus, ESG ability is tied to the human aspect of sustainability management (Jackson *et al.*, 2011; Renwick *et al.*, 2016), which indicates that a change in both cultures and behaviours is essential to encourage managers to adopt attitudes that result in actions promoting the company's sustainability efforts.

This study addresses the industry's sustainability challenges, which would be valuable for academics and practitioners. From a theoretical

viewpoint, our study contributes to the debate on ESG scores and their current shortcomings in adequately capturing a firm's sustainability characteristics. This paper appears to be the first known systematic attempt to integrate the sustainability orientation into the computation of ESG performance in the blue economy domain. Sustainability orientation is evaluated as a prerequisite, while ESG performance is defined as the measurable realisation of ESG outcomes. In sum, the ESG Ability Score marks a significant advance in existing methodologies by improving upon both the general scores created by large providers (e.g. LSEG ESG, S&P) and the industry-specific scores developed for the shipping and port sectors (dos Santos and Pereira, 2022; Tsatsaronis *et al.*, 2024).

From a managerial perspective, the ESG Ability Score acts as a diagnostic and strategic tool offering significant benefits for various players in the blue economy. The dual perspective of the ESG Ability Score ensures that potential discrepancies between sustainability orientation and ESG performance are explicitly discernible. Firms can therefore adopt the proposed tool for self-assessment to better comprehend their sustainability profile, financial requirements, and necessary actions to facilitate the sustainability transition. A good practice would be to compare the ESG Ability Score obtained by applying our proposed methodology with the sustainability rating calculated by external providers, if available. This comparison would help to reduce the bias related to the content analysis of the sustainability reports reviewed: if a company has used the "right" keywords, it can achieve a high ESG Ability Score even with behaviours that are far from ethical. In our sample, only Fincantieri has high sustainability ratings calculated by external providers that align with the high ESG Ability Score. If there is a discrepancy, the ESG Ability Score would become a diagnostic tool for identifying ESG greenwashing practices.

Moreover, the ESG Ability Score can be incorporated into toolboxes used by companies for internal benchmarking and sustainability road-mapping. The tool can also indirectly guide production systems towards being better prepared for sustainable development. The iterative nature of the ESG Ability Score also allows companies to track progress over time, thus facilitating continuous improvement. Additionally, banks can use the tool to analyse the overall sustainability of their customers, as well as tailor green and social credit products (i.e. green, sustainability-linked, or social loans) to meet the needs of firms. Finally, supply chain leaders can leverage the tool to ensure a sustainable supply chain and assist supplier firms in achieving a swift and effective transition process.

Despite the contributions of this study, it has a few limitations. First, the results may only be applicable to the Italian context. Future research could consider cross-validating the ESG Ability Score with samples collected from other countries to extend the generalisability of the results. Second, the effective application of the innovative score is subject to rich datasets, and large numbers of sample observations, running over long time-horizons. In contrast, our sample comprised a reduced number of shipyards and shipping firms, because there is no comprehensive data on them apart from scattered information in the media and reports on certain activities or from certain entities operating on the market. In future studies,

the usefulness of the tool could be evaluated based on feedback from survey respondents. Third, this study concerned the use of a prepackaged ESG score, whose machine-learning algorithm could be modified in future research to measure more granular components of ESG tailored to the specificities of the sample analysed. For instance, size is one of the most recurring biases when measuring ESG performance, as larger firms tend to be automatically favoured over SMEs, as the former can afford to invest more resources into sustainability (Pagano *et al.*, 2018).

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Artificial intelligence automation, augmentation, and human-centricity for firm resilience [1] [2]

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Abstract

Frame of the research. *Rapid advancements in artificial intelligence (AI) have fundamentally transformed how firms create and deliver value. Simultaneously, recent decades have been marked by an increasing frequency and severity of exogenous shocks; accordingly, management literature has emphasized firm resilience as a key meta-capability for firm survival. Given that AI can shape how firms sense and respond to uncertainty, it is plausible that it also plays a role in shaping firm resilience.*

Purpose of the paper. *This paper aims to investigate how AI and human intelligence shape the development of firm resilience.*

Methodology*. We develop a conceptual framework that integrates the automation and augmentation approaches to AI with established resilience micro-capabilities: redundancy, robustness, agility, flexibility, adaptability, and resourcefulness. Adopting a dialectical approach, we analyze the interrelation between AI and human intelligence in the development of these micro-capabilities.*

Results*. We identify three interrelated spaces (i.e., automation, augmentation, and human-centricity) for the development of firm resilience micro-capabilities. Automation primarily supports redundancy and robustness; augmentation enables agility, flexibility, and adaptability; and resourcefulness is grounded in human-centricity. The framework also elucidates how these spaces contribute to both absorptive and adaptive resilience.*

Research limitations. *The conceptual nature of this study calls for future empirical corroboration.*

Managerial implications. *This study provides managers with a conceptual map to guide the strategic orchestration of human and AI resources in building firm resilience.*

Originality of the paper. *This paper offers a novel and integrative perspective on firm resilience by linking AI and human intelligence to firm resilience micro-capabilities. By adopting a dialectical approach of automation, augmentation, and human-centricity, it advances current understandings of how AI can be leveraged as a foundational enabler of firm resilience.*

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Key words: *firm resilience; artificial intelligence; automation space; augmentation space; human-centric space*

1. Introduction

The advent of artificial intelligence (AI) is revolutionizing the business landscape by driving a transformative shift that reshapes industries, redefines how value is created within firms (Gama and Magistretti, 2023; Aagaard and Tucci, 2024; Chatterji *et al.*, 2026), and influences their sustainability (Lanfranchi *et al.*, 2025). AI can process enormous amounts of data and transform them into information (Prasetyo *et al.*, 2025) with a level of precision and speed that far surpasses human capabilities (Krakowski *et al.*, 2023).

Over the past decades, firm resilience has gained prominence in business studies due to unpredictable, high-impact exogenous shocks (Williams *et al.*, 2017). The well-being of shareholders, employees, and entire territories is closely linked to firms' ability to absorb and adapt to such shocks (Lengnick-Hall *et al.*, 2011; Kahn *et al.*, 2013, 2018). Accordingly, the literature has extensively focused on identifying the factors that make some firms more resilient than others (Carmeli and Markman, 2011). Furthermore, scholars have identified the key micro-capabilities underlying firm resilience: redundancy, robustness, agility, flexibility, adaptability, and resourcefulness (Conz and Magnani, 2020).

Studies have begun to bridge the literature on AI and resilience, primarily focusing on AI as an enabler of supply chain resilience (Iftikhar *et al.*, 2024; Ismail *et al.*, 2025; Dai and Zhang, 2026) or human resource resilience (Panda *et al.*, 2024). However, framing AI and human intelligence merely as a dichotomy may lead to misleading conclusions (Raisch and Krakowski, 2021; Shepherd and Majchrzak, 2022). Greater attention should instead be devoted to augmentation, grounded in the synergies between AI and human intelligence (e.g., moving from Kemp, 2024, who proposes a framework for developing competitive advantage). Both AI and human intelligence can be conceptualized as key drivers of organizational action and decision-making (Nauhaus *et al.*, 2021; Raisch and Krakowski, 2021), which are central to resilience micro-capabilities (Conz and Magnani, 2020).

The lack of clarity on how AI and human intelligence jointly shape firm resilience at the micro-capability level warrants attention for two reasons. First, given the inexorable diffusion of AI, a deeper understanding of its impact on firm resilience can support more informed and effective integration of AI into organizational processes. Second, in light of the increasing frequency and inevitability of exogenous shocks, it is essential to disentangle the roles of AI and human intelligence in enabling firm resilience. Accordingly, we formulate the following research question:

RQ: *How do AI and human intelligence interrelate to shape the development of firm resilience micro-capabilities?*

AI may serve as a "milestone," fundamentally reshaping each firm resilience micro-capability to better face adverse conditions. Accordingly, this study examines how AI and human intelligence impact the six key micro-capabilities underpinning firm resilience.

We adopt a dialectical approach to unpack the role of AI in the development of resilience (Smith and Lewis, 2011), examining both automation and augmentation. In the *automation* approach, machines perform tasks previously accomplished by humans (Raisch and Krakowski, 2021). By contrast, *augmentation* involves humans collaborating closely with machines to complete tasks (Raisch and Krakowski, 2021). The output generated by machines becomes input for human activities, which in turn feed back into machines in an iterative process until interrupted by human intervention. However, in some cases, the role of human intelligence in creativity, intuition, and emotional insight remains central (Goleman, 1995).

Based on a conceptual investigation, our framework elucidates AI's role via automation in fostering redundancy and robustness; reveals the role of AI via an augmentation approach in enabling flexibility, agility, and adaptability; and emphasizes the role of human intelligence in driving resourcefulness.

This study makes three key contributions. First, we advance AI research by examining the impact of AI and human intelligence on firm resilience through the dual lenses of automation and augmentation (Raisch and Krakowski, 2021). Drawing on Ketchen *et al.* (2007), we emphasize that AI's value remains potential high only when complemented by human intelligence. We enrich the debate on AI as both a "player and a coach" of firm capabilities and of the antecedents of resilience in particular.

Second, we contribute to the literature on resilience by arguing that AI can help firms mitigate exogenous shocks and navigate the *permacrisis* age (Brown *et al.*, 2023; Conz *et al.*, 2026). We offer an innovative perspective on the antecedents of firm resilience, complementing existing multi-level and multi-theoretical approaches (Aversa *et al.*, 2024).

Third, we highlight the possible interrelation of three spaces (automation, augmentation, and human-centricity) in the development of firm resilience and identify the mechanisms that shift the balance among these spaces in response to change and the permacrisis.

The remainder of this paper is organized as follows. First, we review the literature on AI and firm resilience. Next, we present a conceptual framework illustrating the role of AI and human intelligence in shaping the six core micro-capabilities driving firm resilience (Conz and Magnani, 2020). Subsequently, we discuss the mechanisms underlying the interrelations among the automation, augmentation, and human-centric spaces in shaping firm resilience. The paper concludes with a discussion and potential directions for future research.

2. Literature background

2.1 Artificial intelligence: An overview

AI employs various techniques, such as machine learning, neural networks, and deep learning (LeCun *et al.*, 2015; Haenlein and Kaplan, 2019; Aggarwal, 2023). *Machine learning* focuses on teaching machines to learn from data by developing algorithms that uncover patterns and make predictions (Choi *et al.*, 2020). *Neural networks* are "machine learning techniques that simulate the mechanism of learning in biological organisms" (Aggarwal, 2023, p. 1). While learning in biological organisms relies on external stimuli, in artificial neural networks these stimuli come from training data (Aggarwal, 2023). *Deep learning* has proven effective in uncovering complex structures within data, enabling models to recognize patterns and extract meaningful features without explicit human guidance (LeCun *et al.*, 2015). More precisely, deep learning is a category of machine learning that uses neural networks. It is characterized by "depth," which refers to the large number of hidden layers among the input and output layers of the network (Haenlein and Kaplan, 2019; Secchi, 2022).

Furthermore, a new form of AI, distinct from traditional AI, is gaining increasing importance: *Generative AI* (GenAI). Whereas traditional AI systems are primarily utilized for data analysis and predictive modeling, GenAI goes further by generating new data that closely resemble the characteristics of the training set (Aagaard and Tucci, 2024). GenAI is considered "a form of AI that can drive innovation through new product discovery and development" (Mariani and Dwivedi, 2024, p. 1)[3]. OpenAI's introduction of Generative Pre-trained Transformers (GPT) marked a significant advancement in natural language processing (NLP). GPT progressively pushes the limits of AI capabilities, enabling the performance of tasks traditionally considered uniquely human (Marcus and Davis, 2020). By aggregating evaluations between LLMs and prompts, managers may harness GenAI to provide useful insights for strategic decisions (Doshi *et al.*, 2025). Additionally, GenAI may boost firm performance although the effect of its adoption is moderated by ethical leadership (Kumar *et al.*, 2025).

[3] Building on deep learning and neural network architectures, natural language processing (NLP) and large language models (LLMs) have emerged as key approaches for language-related tasks (Doshi *et al.*, 2025). Natural language processing (NLP) is a branch of AI "in which computer machines can analyze and interpret human speech for human-computer interaction (HCI) to generate structural knowledge for information retrieval operations, text and automatic text summarization, sentiment and speech recognition analysis, […] at different levels of Q&A chatbots" (Lee, 2025, p. 11). A major advancement in NLP emerged with the introduction of the Transformer architecture (Vaswani *et al.*, 2017), which laid the foundation for the development of LLMs (Zhou, 2025). LLMs are defined as models that "predict the next word based on past statistical patterns" (Chatterji *et al.*, 2026, p. 7). The label "large" reflects the enormous number of parameters embedded in these models, potentially exceeding one trillion (Doshi *et al.*, 2025). Large language training is based on an enormous amount of data, and these models display emergent capabilities, such as the ability to address novel questions (Wei *et al.*, 2022).

2.2 Managing artificial intelligence

AI has become pervasive in the daily lives of both firms and individuals, affecting domains such as smart homes, healthcare, and safety (Stone *et al.*, 2016; Rahwan *et al.*, 2019; Kaplan and Haenlein, 2020). This disruptive innovation has rendered certain business models obsolete (Berente *et al.*, 2021) while creating opportunities to develop novel and more effective solutions to meet human needs, thereby generating new business opportunities (Agrawal *et al.*, 2018; Townsend and Hunt, 2019; Davenport *et al.*, 2020). It is therefore not surprising that AI is revolutionizing several industries (Wilson and Daugherty, 2018), permeating virtually all activities within Porter's value chain across many firms (Kolbjørnsrud *et al.*, 2016), and redefining how value is created and distributed both within organizations (Haefner *et al.*, 2021) and across their ecosystems (Aagaard and Tucci, 2024). Furthermore, AI is transforming customer relationship management (CRM) from a data-driven approach to an AI-driven strategy (Ledro *et al.*, 2022).

Within this broader transformation, recent studies have begun to examine AI's implications for management, particularly in human resource management (HRM), where AI enables the integration of new capabilities into organizational practices, further highlighting its managerial relevance (Tambe *et al.*, 2019; Laviola *et al.*, 2024). Broadly, AI can be leveraged to enhance key HRM processes, including employee selection and training (Tambe *et al.*, 2019). Some scholars have also conceptualized AI as a "coach" for workers and managers, defined as "a machine-assisted, systematic process to help clients set professional goals and construct solutions to efficiently achieve them" (Graßmann and Schermuly, 2021, p. 109).

Human intelligence relies on heuristics to process information, which can lead to distortions and errors, often referred to as cognitive biases (Krakowski *et al.*, 2023). Concurrently, it embodies boundless creativity, intuition, and emotional intelligence (Goleman, 1995). Pivotal AI capabilities include "data pipeline capability" and algorithm development capability (Sjödin *et al.*, 2021, p. 578; Shrestha *et al.*, 2021). AI and human intelligence appear to be oriented toward different activities and are distinguished by their unique strengths and weaknesses (Krakowski *et al.*, 2023; Raisch and Fomina, 2025; for a review see Ramaul *et al.*, 2026). Thus, understanding their distinct strengths, limitations, and interrelations is crucial for both scholars and practitioners.

Scholars have identified two main approaches to exploring AI's role in strategy. The first is the *automation* approach, which heightens the tension between AI and human intelligence rather than exploring areas of integration. This approach places human intelligence and AI in an "either/or" relationship, where broader AI adoption corresponds to a diminished role for human intelligence within a firm. Thus, the automation approach is conceptually built on the tensions between humans and AI rather than their collaboration. This tension reaches its apex when automation is no longer perceived as a complementary tool to enhance human capabilities but as an approach designed solely to supplant human workers.

The second is the *augmentation approach*, which manages the tension between AI and human intelligence as a trigger for a new attitude rooted in a "both/and" relationship (Raisch and Krakowski, 2021). In today's competitive context, relying on AI solely for automation reflects an outdated approach that is unsuitable for navigating high levels of uncertainty. Consequently, firms face higher risks of imitation and increased vulnerability (Raisch and Krakowski, 2021). By contrast, augmentation combines the strengths of both humans and AI (Raisch and Krakowski, 2021).

We argue that the coexistence of AI and human intelligence follows a Hegelian dialectical approach to their relationship. Dialectics resolves contradictory elements (thesis and antithesis) through synthesis. The *thesis-antithesis-synthesis* movement represents a process of knowledge progression in which each synthesis becomes a new thesis, is confronted by an antithesis, and is resolved into a further synthesis in a continuous spiral. Following this reasoning, we conceptualize the augmentation of AI and human intelligence as Hegelian *Aufhebung*, that is, the moment of synthesis that unifies thesis and antithesis.

AI and human intelligence are "both contradictory and interrelated" (Smith and Lewis, 2011, p. 387). Given their interrelated nature, we adopt a dialectical approach (Smith and Lewis, 2011) to address underlying paradoxical (Raisch and Krakowski, 2021) and dialectical tensions. Specifically, "integration is temporary" (Smith and Lewis, 2011, p. 387), culminating in a continuous interrelation.

To augment human intelligence with AI, humans must understand "where, when, and how to best utilize" AI efficiently (Robertson *et al.*, 2024, p. 499). In this regard, augmentation holds paramount significance, as human cognitive processes extend beyond mere data collection and processing; they are also shaped by what Carl Jung referred to as intuitive intelligence (Jarrahi, 2018). Accordingly, it is now widely accepted that human reasoning is not purely a conscious or deliberate process. Modern cognitive science posits that a significant portion of human cognition, including many higher-level cognitive functions, operates unconsciously (Hodgkinson *et al.*, 2009).

In this context, it is essential to distinguish intuitive intelligence from instinct. Intuitive intelligence is closely tied to "intuition," that is, "thoughts, conclusions and choices produced largely or in part through non-conscious mental processes" (Hodgkinson *et al.*, 2009, p. 280). By contrast, instinct refers to innate, reflex reactions (Hodgkinson *et al.*, 2009). In summary, accounting for elements of human intelligence, such as intuitive intelligence (Jarrahi, 2018) and cognitive styles (e.g., adaptors and innovators; Kirton, 1976), is crucial for augmentation, as "tailoring human-AI interaction to individuals' cognitive needs enables performance gains" (Krakowski *et al.*, 2026, p. 69).

2.3 Firm resilience

Resilience enables firms to address unpredictable exogenous events (Taleb, 2010) and moments of discontinuity in their lifecycle that can

undermine performance or survival (Ramezani and Camarinha-Matos, 2020). Wars, pestilences, earthquakes, and hurricanes have shaped human history, both in the past and present (Bouncken *et al.*, 2022). Consequently, firms must develop resilience capabilities to handle continuous challenges (Kantur and İşeri-Say, 2012; Hillmann, 2021; Su and Junge, 2023). Furthermore, ongoing globalization, coupled with institutional, demand, and technological uncertainties, makes firms even more vulnerable (Dagnino *et al.*, 2021). To survive in a state of perpetual crisis, known as *permacrisis*, firms must exercise their resilience capabilities (Brown *et al.*, 2023; Conz *et al.*, 2026).

Scholars have devoted significant attention to resilience, offering various definitions across theoretical perspectives and disciplines (Conz and Magnani, 2020; Aversa et al., 2024). Extant literature emphasizes the *contextual* nature of resilience (Lengnick-Hall *et al.*, 2011) and highlights the variety of organizational responses across different phases of exogenous events (Martinelli *et al.*, 2021). Specifically, studies have identified multiple antecedents of resilience, including entrepreneurs' psychological factors (Williams *et al.*, 2021), individual resilience (Martinelli and Tagliazzucchi, 2019; Giaccone and Picone, 2026), firm characteristics (Hillmann and Guenther, 2021; Su and Junge, 2023), and supply chain contributions (Pal *et al.*, 2024).

Summarizing prior literature, Hepfer and Lawrence (2022, p. 15) describe strategic resilience as a firm's "ability to anticipate and respond to threats to its strategy, and especially its long-term goals." Accordingly, the literature distinguishes between two types of resilience: proactive and reactive. *Proactive* resilience reflects a firm's readiness in times of adversity and embodies the sensitivity of its organizational "epidermis," enabling early detection of potential disruptions (Williams *et al.*, 2017). Strengthening this sensitivity requires providing firms with the tools needed to implement anticipation strategies for managing unforeseen events (Williams *et al.*, 2017). Proactive resilience enhances awareness of vulnerabilities and potential threats, thereby facilitating the adoption of proactive strategies (Erol *et al.*, 2010). Temporally, proactive resilience occurs before an event materializes (Duchek, 2020). Therefore, it plays a crucial role in mitigating the consequences of disruptive events by anticipating them (i.e., acting *ex-ante*). For example, a retail firm demonstrates proactive resilience if it anticipates shifts in consumer preferences or invests in slack resources, thereby foreseeing disruptive changes.

By contrast, *reactive* resilience becomes essential when a firm must address the consequences of a disruption ex-post (Boin and Van Eeten, 2013). For instance, firms in the travel and tourism industry demonstrated reactive resilience in response to COVID-19 disruptions. Although they initially experienced a decline in performance, they recovered successfully (Munoz *et al.*, 2022).

Additionally, scholars have distinguished between absorptive and adaptive resilience (Hepfer and Lawrence, 2022). *Absorptive* resilience refers to a firm's capability to mitigate new exogenous conditions, emphasizing its ability to withstand external changes (Kahn *et al.*, 2018). This concept is rooted in early mechanical engineering studies (Rankine,

1867). Absorptive resilience facilitates the restoration of the *status quo ante* and minimizes the negative consequences of shocks (Kahn *et al.*, 2013). For example, a firm with absorptive resilience possesses financial redundancies that enable it to absorb shocks and limit performance decline following a disruptive event.

Adaptive resilience highlights responses to new exogenous conditions by adopting an ecological perspective (Holling, 1973). It refers to the capability to adjust and undergo metamorphosis in response to disruptions, thereby achieving multiple new equilibria (Morais-Storz and Nguyen, 2018). Hence, firms demonstrating adaptive resilience change their business model in response to disruptions, leveraging new technologies or consumer trends to evolve operations and ensure long-term sustainability. Firms may adopt either absorptive or adaptive resilience in response to disruptions, as both strategies are equally effective (Conz and Magnani, 2020).

Since resilience is a multifaceted and multidimensional meta-capability, investigating the relationship between AI and firm resilience requires identifying the core micro-capabilities that constitute resilience. Among various taxonomies, the one proposed by Conz and Magnani (2020) is the most relevant, as it facilitates a comprehensive exploration of these micro-capabilities. This taxonomy distinguishes six core capabilities of firms' resilience:

i. *Redundancy* refers to the micro-capability to keep "some resources in reserve to be used in case of a disruption" passively (Sheffi and Rice, 2005, p. 44).
ii. *Robustness* refers to the micro-capability to absorb negative consequences of disruptive events without sustaining any damage (Erol *et al.*, 2010) or by minimizing potential harm (Kantur and İşeri-Say, 2012). It relies on the deliberate use of excess resources (namely, redundancy) "to withstand pressure on performance and remain insensitive to disruption" (Munoz *et al.*, 2022, p. 183).
iii. *Agility* refers to the micro-capability to respond to emerging turbulence by overcoming obstacles (Ismail *et al.*, 2011), while demonstrating strategic sensitivity (Doz and Kosonen, 2008).
iv. *Flexibility* refers to the micro-capability to learn quickly and adjust plans in response to shifts (Pal *et al.*, 2014). It enables a firm to change strategies rapidly. Specifically, we focus on strategic flexibility, defined as the timeliness of decision-making processes (Pal *et al.*, 2014).
v. *Adaptability* refers to the micro-capability to adjust promptly and effectively in response to disruptions.
vi. *Resourcefulness* refers to the micro-capability to actively harness and orchestrate resources creatively to capitalize on opportunities and address challenges (Williams *et al.*, 2021).

Redundancy and robustness are absorptive resilience capabilities because they primarily focus on withstanding and buffering the consequences of disruptive events without involving change or evolution. Meanwhile, adaptability and flexibility are adaptive resilience capabilities (Conz and Magnani, 2020) that enable firms to change in response to disruptive exogenous events. Most literature considers agility as an

absorptive resilience capability (Conz and Magnani, 2020). However, within our conceptual framework, agility is both absorptive and adaptive, as it enables firms to swiftly overcome obstacles in response to changes in demand or technology (Dagnino *et al.*, 2021). Resourcefulness stands out as an adaptive micro-capability that facilitates both adaptation and metamorphosis. Conz and Magnani (2020) define resourcefulness as "the capability to accumulate different diversified assets and resources" (p. 409) and at the same time, creatively utilize resources (Williams *et al.*, 2021).

3. Toward a conceptual framework: Harnessing human and artificial intelligence for firm resilience

The development of firm resilience micro-capabilities is inextricably shaped by intelligence, derived from the Latin *intelligentia* (Castiglioni and Mariotti, 1996), which evokes the capability to discern, comprehend, and effectively navigate changes. Our framework considers two forms of intelligence: human and artificial. Therefore, it is essential for firms to manage the interrelated spaces of automation, augmentation, and human-centricity concurrently to develop the core micro-capabilities underpinning firm resilience (Conz and Magnani, 2020).

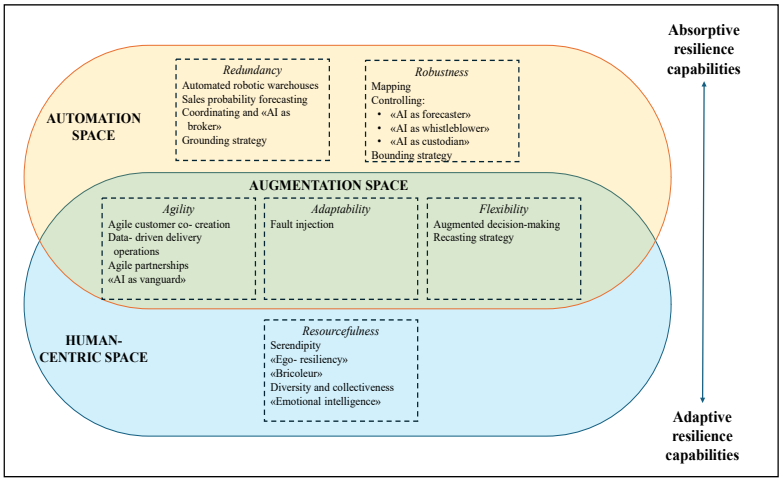
Fig. 1 presents our conceptual framework. We theorize the impact of AI on each core micro-capability underlying firm resilience. We contend that human-centricity remains a core factor in fostering firms' resilience micro-capabilities, such as resourcefulness. In parallel, we conceptualize redundancy and robustness in the automation space, where machines take over tasks previously performed by humans (Raisch and Krakowski, 2021), while humans' roles remain primarily situated upstream in training AI algorithms (Sjödin *et al.*, 2021). The augmentation space concerns the development of agility, flexibility, and adaptability (Raisch and Krakowski, 2021). Indeed, "automation may be suitable for routine tasks" (Krakowski *et al.*, 2026, p. 68), while exploratory tasks (e.g., solving new problems; Raisch and Fomina, 2025) require both human intelligence and AI. Arguably, the three spaces (automation, augmentation, and human-centricity) are not independent; rather, they may be dynamically interrelated.

3.1 Resilience micro-capabilities in the automation space

3.1.1 Redundancy

The literature shows that firm resilience requires slack resources (Conz *et al.*, 2023), particularly redundancies. Redundancy refers to keeping reserve resources available for use in case of disruption (Sheffi and Rice, 2005). These resources may have latent functionality that becomes fully evident in adverse situations (Munoz *et al.*, 2022), thereby serving their risk-protection role. This latent functionality highlights the tension between resilience and financial performance (Iftikhar *et al.*, 2021), which stems in part from the trade-off between redundancy and efficiency.

Fig. 1: Conceptual framework:
Harnessing AI and human intelligence for firm resilience



Source: Authors' elaboration

Firm efficiency is achieved primarily by minimizing resources (e.g., inventory, financial resources). For instance, Just-in-Time (JIT) models exemplify efficiency: "the reason for the adoption of JIT was to make the facility more efficient and reactive to the product-market environment," primarily through inventory reduction (Huson and Nanda, 1995, p. 305). Redundancy relies on the availability of slack resources (Conz *et al.*, 2023), whereas efficiency depends on minimizing resource deployment within firms. Consequently, a fundamental trade-off exists between the two concepts.

Hence, firms must carefully navigate this inherent tension as building redundancy remains essential for absorbing the negative impacts of disruptions. This typically involves holding additional financial resources, sustaining inventory stocks, and/or maintaining relationships with secondary suppliers, each of which entails significant costs (Sheffi and Rice, 2005). Consequently, redundancy often leads to increased costs and potential inefficiencies, despite its value in enhancing firm resilience.

The literature identifies a strong positive relationship between firm resilience and non-financial performance (Yu *et al.*, 2019; Iftikhar *et al.*, 2021). Resilience enhances operational performance, creates customer value, and supports competitive advantage (Chowdhury and Quaddus, 2016). The literature finds a weaker positive relationship between firm resilience and financial performance (Yu *et al.*, 2019; Iftikhar *et al.*, 2021), suggesting that investments in resilience may incur financial penalties (Yu *et al.*, 2019). The role of AI in enhancing efficiency is widely acknowledged in the literature, highlighting its potential to generate significant cost reductions and efficiency gains (Mariani *et al.*, 2023).

Building on these insights, we suggest that AI helps mitigate the tension between firm resilience and financial performance by addressing the

trade-off between efficiency and redundancy. Specifically, AI capabilities contribute to redundancy by enabling firms to define the optimal balance between redundancy and efficiency.

AI is useful in mapping areas within firms that underutilize resources to enhance efficiency (Mariani *et al.*, 2023). For example, an "automated robotic warehouse" allows real-time inventory tracking and control. Therefore, AI is valuable for optimizing inventory control and logistics (Aagaard and Tucci, 2024) by enhancing efficiency (Shil *et al.*, 2024). Accordingly, it becomes appropriate to shift from a "traditional warehouse" to an "automated robotic warehouse" (Aagaard and Tucci, 2024). AI's application in demand forecasting and planning (Lolli *et al.*, 2019), as well as inventory management, helps reduce stockout days and increase inventory turnover rates (Cantini *et al.*, 2024) by identifying the level of redundancy that makes a firm both resilient and efficient.

Moreover, the relevance of AI in enhancing firm resilience extends beyond logistics and warehouses; it also strengthens security and enables monitoring of a firm's "financial health," particularly regarding financial redundancy (Ramezani and Camarinha-Matos, 2020). By contributing to monitoring financial health, AI can guide firms in maintaining the appropriate level of financial redundancy in the face of uncertainty.

AI employs analytical capabilities to process data and uncover relationships useful for forecasting, such as predicting sales probabilities (Reddy Vangoor *et al.*, 2024). Accordingly, it serves as an "information tool to anticipate changes in demand" (Broekhuizen *et al.*, 2023, p. 3) and plays a proactive role in developing redundancy. In particular, AI enables autonomous data processing, including data gathered through advanced sensors and equipment. AI's application in forecasting sales probabilities (Reddy Vangoor *et al.*, 2024) can achieve a synthesis between efficiency models and redundancy, while also mitigating the trade-off between them.

By leveraging AI, firms can define reserves and excess resources within the automation space. This role is facilitated by AI as a "broker" that can enhance "supply chain management by assisting firms in effectively allocating resources" (Broekhuizen *et al.*, 2023, p. 7). AI enhances efficiency and facilitates the coordination and integration of diverse partners, such as supply chain management, through predictive models (Shil *et al.*, 2024).

Moreover, algorithm development capability (Sjödin *et al.*, 2021; Shrestha *et al.*, 2021) enables the creation and reconfiguration of contextualized AI anchored in a firm's unique knowledge through a "grounding" strategy (Kemp, 2024).

However, it is essential to recognize the limitations of forecasting models that utilize AI. They rely on past data to predict future trends, which introduces potential biases (Krakowski *et al.*, 2023).

Overall, we recognize the critical role of AI in automating redundancy development through several mechanisms: automated robotic warehouses (Aagaard and Tucci, 2024); sales probability forecasting (Reddy Vangoor *et al.*, 2024); efficient resource allocation through AI as a "broker" (Broekhuizen *et al.*, 2023); and "grounding" strategies (Kemp, 2024).

3.1.2 Robustness

Previous studies agree that robustness[4] represents a micro-capability of firm resilience (Conz and Magnani, 2020) that supports minimizing the negative consequences of disruptive events and uncertainty. AI affects robustness by enabling firms to anticipate and address risks, for example, by serving as a forecasting tool (Agrawal *et al.*, 2018). The development of robustness is linked to AI primarily through its mapping and controlling functions (Broekhuizen *et al.*, 2023).

The mapping function facilitates scanning internal and external environments and addressing issues by analyzing extensive databases to identify firms' weaknesses and external threats (Broekhuizen *et al.*, 2023).

However, the controlling function facilitates the detection of anomalies and anticipation of potentially detrimental consequences (Broekhuizen *et al.*, 2023). This enables the implementation of preventive strategies aimed at minimizing response times (Erol *et al.*, 2010) and supporting proactive resilience. This function enhances robustness by leveraging AI acting as a "forecaster," "whistleblower," and "custodian" of knowledge (Broekhuizen *et al.*, 2023, p. 5), in conjunction with a "bounding" strategy (Kemp, 2024).

i. AI as a "forecaster" refers to its predictive capabilities. Notably, a decrease in prediction costs (Agrawal *et al.*, 2018) enables firms to explore alternative scenarios through proactive simulations, which play a central role in identifying potential futures and detecting obstacles (Kelleher *et al.*, 2020). By providing environmental, technological, competitive, and supply chain information, AI can help anticipate and prevent disruptive events (Zong and Guan, 2025), thereby enhancing robustness.

ii. AI as a "whistleblower" allows firms to implement rapid warning systems (Broekhuizen *et al.*, 2023). For example, AI can perform sentiment analysis (Bouschery *et al.*, 2023) to "analyze inter-partner communication or negative customer feedback to detect negative sentiments" (Broekhuizen *et al.*, 2023, p. 6).

iii. AI as a "custodian" of knowledge protects and strengthens firms when combined with a "bounding" strategy (Kemp, 2024). Both AI as a "custodian" of knowledge (Broekhuizen *et al.*, 2023) and the "bounding" strategy aim to counter the notion of AI as merely explicit knowledge (Kemp, 2024). AI as a "custodian" monitors and prevents intellectual property violations, especially in open innovation (Broekhuizen *et al.*, 2023). The "bounding" strategy further enhances robustness through encryption, cybersecurity measures, and confidentiality agreements with suppliers, employees, and coopetitors (Kemp, 2024).

[4] Robustness can be conceptualized in two ways, either as a distinct capability that enables the complete avoidance of performance degradation during disruptive events (Munoz *et al.*, 2022), or as an intrinsic micro-capability within the broader construct of firm resilience (Kantur and İşeri-Say, 2012), which helps minimize such degradation. In our study, we adopt the latter view, framing robustness as a micro-level firm resilience capability.

3.2 Firm resilience micro-capabilities in the augmentation space

3.2.1 Agility

We adopt the definition of agility as a firm's capability to swiftly respond to emerging turbulence by overcoming obstacles (Ismail *et al.*, 2011) while demonstrating strategic sensitivity (Doz and Kosonen, 2008). To develop agility, AI augments the human capability to predict (Zong and Guan, 2025) and manage environmental and social transformations (Minà and Michelini, 2024) using data-driven and customer-oriented managerial approaches.

In today's transformative and uncertain landscape (e.g., demand uncertainty), it is imperative to embrace a "holistic and human-centric approach that addresses the technological, organizational, and strategic facets of AI deployment for enduring success and competitiveness" (Aagaard and Tucci, 2024, p. 303). Accordingly, adopting AI enables a strategic transition "toward data-driven, customer-centric, and flexible business practices," marking a shift to a new era (Aagaard and Tucci, 2024, p. 297).

Specifically, AI predictive capabilities enable a deep understanding of customer preferences, which strengthens agility. For instance, the literature recognizes an archetype of AI application called "experience innovators," which adopt AI to engage and customize products and services, "prioritizing customer-centric AI applications" (Aagaard and Tucci, 2024, p. 307). Thus, if AI tools can identify unmet needs (Lanzolla *et al.*, 2021) or align with customer preferences, they can foster agility.

We account for agile customer co-creation, data-driven delivery operations (Sjödin *et al.*, 2021), agile partnerships, and AI as a "vanguard" (Broekhuizen *et al.*, 2023) as key capabilities and strategies that enable the development of agility.

i. Agile customer co-creation involves adopting the augmentation approach, which extends beyond firm boundaries. Customers and firms iteratively co-create new solutions by leveraging AI (Sjödin *et al.*, 2021). Agility through customer co-creation enables the early deployment of AI microservices even before development and testing are complete, fostering cooperation between firms and customers for final development (Sjödin *et al.*, 2021). This dimension of agility opens new frontiers in human-machine interactions in the context of augmentation, establishing an interactive relationship characterized by transparency and reciprocal exchange beyond firm boundaries. "Agile customer co-creation" allows for the development of new solutions leveraging AI, constituting a key element of cooperation between firms and customers. However, the advent of GenAI makes it imperative to embrace the constant evolution of AI to personalize customer relationships. Therefore, GenAI enables a heightened form of personalization, known as "hyper-personalization," allowing firms to quickly tailor products or services to each customer preferences (Aagaard and Tucci, 2024).

ii. Data-driven delivery operations (Sjödin *et al.*, 2021) involve aligning firms' products and services with customer preferences and processing real-time data through AI to respond promptly to customer needs. These operations are performed using an augmentation approach that involves skilled engineers assessing AI-generated recommendations (Raisch and Krakowski, 2021).
iii. Agile partnerships enable the construction of strategic networks between firms to jointly explore AI opportunities. Co-creation through AI extends beyond customer involvement and can broaden a firm's boundaries to include other actors (Gama and Magistretti, 2023). Agile partnerships can take the form of open innovation, cooperation, or coopetition. To ensure their success, AI can act as a "custodian" to safeguard knowledge and prevent opportunistic behaviors (Broekhuizen *et al.*, 2023).
iv. AI as a "vanguard" may contribute to firm agility by mitigating exposure to demand uncertainty (Broekhuizen *et al.*, 2023). Specifically, it enables the assessment of new business opportunities and monitoring of emerging trends, fostering the dimension of agility known as "strategic sensitivity" (Doz and Kosonen, 2008).

3.2.2 Flexibility

The literature identifies flexibility as a key firm resilience micro-capability, defined as the ability to learn quickly and adjust plans in response to shifts (Pal *et al.*, 2014), thereby enabling firms to change strategies rapidly (Conz and Magnani, 2020). Flexibility also concerns the timeliness of decision-making processes (Pal *et al.*, 2014). This micro-capability is essential in times of high uncertainty, as it allows tempestive judgments and rapid responses to changes (Shimizu and Hitt, 2004).

AI is inherently flexible because it evolves with emerging trends, reconfigures itself to meet diverse user needs, and develops solutions beyond those initially envisaged (Haenlein and Kaplan, 2019). For example, Haenlein and Kaplan (2019) describe AI as a tool that allows firms to learn from existing data and fit flexibly to their environment.

We acknowledge that AI plays a crucial role in enabling flexibility by integrating analytical reasoning and intuitive processes for decision-making (Akinci and Sadler-Smith, 2012; Jarrahi, 2018; Shrestha *et al.*, 2021). AI augments human decision-making capabilities (Chatterji *et al.*, 2026), facilitates new modes of interaction with customers (Wilson and Daugherty, 2018), and enhances creativity and organizational performance (Mikalef and Gupta, 2021). While AI extends human cognition by processing computational information analytically (Shrestha *et al.*, 2021), humans adopt a holistic and intuitive approach to decision-making (Jarrahi, 2018) that transcends mere information, embracing an unconscious yet visionary perspective.

Reasoning, problem-solving, and decision-making have traditionally been viewed as core human cognitive functions (Marcus and Davis, 2020). However, the literature acknowledges that AI can augment these capabilities (Raisch and Krakowski, 2021; Chatterji *et al.*, 2026), supporting flexibility

and human decision-making (Nauhaus *et al.*, 2021). In this context, human intelligence interacts with AI to perform managerial tasks within firms (for a review, see Hillebrand *et al.*, 2025) and GenAI can be leveraged by managers to gain insights into strategic decisions (Doshi *et al.*, 2025).

Developing strategic flexibility also requires a "recasting" strategy, embedding AI "in a firm's system of task, strategic, and relational interdependencies" (Kemp, 2024, p. 8) to align with a firm's strategy and enhance flexibility.

In a real-world context governed by entropy, exclusive reliance on probabilistic and analytical thinking is limiting (Jarrahi, 2018). Similarly, relying solely on intuition and unconscious heuristics risks harm, as intuition is prone to biases and guided by tacit learning from errors and prior experience (Jarrahi, 2018). Analytical decision-making, an attribute of AI, offers faster and higher-quality decisions (Wilson and Daugherty, 2018; Fügener *et al.*, 2022). Nevertheless, despite AI's potential in augmenting decision-making processes, humans seem to remain irreplaceable in decision-making. This irreplaceability is demonstrated by "responsibility" as an inherently human capability (Floridi, 2008) and by the influence of subjective and political factors on rational decisions (Jarrahi, 2018). Managing these factors requires human intelligence, including emotional intelligence (Goleman, 1995), sense-making (Weick *et al.*, 1999), subconscious thinking, empathy, and personality traits that guide intuition (Cable and Judge, 2003).

Overall, the augmentation approach emphasizes the need for a combination of human-related capabilities (e.g., intuition, empathy, and emotional intelligence) and AI strengths. For example, by aggregating evaluations between LLMs and prompts, managers can harness AI to enhance strategic flexibility and inform decision-making (Doshi *et al.*, 2025).

3.2.3 Adaptability

Firm adaptability refers to the micro-capability to adjust promptly and effectively in response to disruptions. While it is inherently tied to the human capability to develop physical, cognitive, and behavioral skills essential for survival and recovery, we argue that a firm's adaptability can be further "augmented" by AI (Raisch and Krakowski, 2021). Specifically, AI supports the development of adaptability through techniques such as fault injection.

Fault injection involves the intentional exposure to errors and induced failures, and contributes to adaptability by equipping firms to respond to similar disruptions in the future (Ramezani and Camarinha-Matos, 2020). Humans interpret fault injection results, develop strategies to address vulnerabilities, and ensure alignment with broader organizational goals, values, and ethical considerations.

By leveraging mechanisms such as fault injection, AI enhances firms' adaptability by complementing human intelligence. In fault injection, humans excel in unstructured situations where ambiguity is intentional, data are incomplete, and creativity and human-machine collaboration are

essential. In this context, human emotions play a critical role in building trust in AI, as humans tend to react more negatively to AI errors than to human mistakes (Fügener *et al.*, 2022). Emotional responses strongly influence perceptions of AI's reliability and effectiveness, making trust inherently fragile. While trust increases when AI demonstrates its capability to enhance firm resilience (e.g., adaptability), it remains vulnerable due to "algorithm aversion" (Fügener *et al.*, 2022). Therefore, fostering trust requires not only showcasing AI's potential to improve adaptability but also addressing emotional barriers that can lead to skepticism and reluctance toward adoption.

Fault injection involves testing unforeseen failures and its proper management it is essential for enabling human-machine collaboration (for a review on human-machine collaboration see Li *et al.*, 2023) in contexts requiring teamwork, and handling sensitive situations.

3.3 Firm resilience micro-capability in the human-centric space

3.3.1 Resourcefulness

Resourcefulness involves the creative orchestration of resources to seize opportunities and overcome obstacles (Williams *et al.*, 2021). By connecting resourcefulness to concepts such as serendipity, "ego resiliency," (Oshio *et al.*, 2018, p. 54), "bricoleur" (Lévi-Strauss, 1966), diversity and collectiveness (Conz and Magnani, 2020), and emotional intelligence (Goleman, 1995), this study emphasizes the indispensable role of human intelligence in cultivating resourcefulness. While primarily rooted in human-centric processes, it enables behaviors that transcend boundaries to generate unplanned sources of value (Williams *et al.*, 2021).

First, resourcefulness can manifest as a firm's ability to improvise and leverage serendipity, particularly under resource constraints (Denrell *et al.*, 2003). As defined by Denrell *et al.* (2003), serendipity emerges from a combination of effort, luck, readiness, and flexibility within a process that precedes unplanned discoveries. Serendipity is triggered by the unexpected, which humans interpret subjectively through processes such as "association" (i.e., the formation of mental connections; Busch, 2024) and "bisociation," which refers to the simultaneous association of objects or ideas typically considered unrelated (Koestler, 1964).

Second, "ego-resiliency" refers to the dynamic capability to temporarily modify one's reactions and perceptions in response to emerging circumstances (Oshio *et al.*, 2018). Individuals with high "ego-resiliency" are enterprising and can adapt to new situations by modifying behavior using versatile cognitive and social strategies (Oshio *et al.*, 2018). In highly stressful situations, such individuals do not act rigidly or repeat mistakes but adjust effectively to challenges (Oshio *et al.*, 2018).

Third, "bricoleur," a term introduced by anthropologist Lévi-Strauss (1966), describes the human capability to leverage available resources to solve problems. It plays a crucial role in creatively utilizing existing resources to generate unplanned value-creating opportunities within the entrepreneurial process (Williams *et al.*, 2021).

Fourth, human diversity within a firm (in terms of gender, ethnicity, and cultural background) enhances creativity, innovation, and resourcefulness (Aggarwal *et al.*, 2019). Collectiveness entails coordination and interaction among individuals, both within and outside a firm, and the promotion of a shared, positive vision that supports creative problem-solving (Conz and Magnani, 2020). Hence, human diversity (Aggarwal *et al.*, 2019) and interaction among individuals within firms foster a shared vision and active participation, contributing to enhanced creative problem-solving (Conz and Magnani, 2020).

Finally, a critical enabler of resourcefulness is a dimension of human intelligence: emotional intelligence, a concept introduced by Goleman (1995). Emotional intelligence is the ability to handle emotions and plays a crucial role in human resilience to stress (Schneider *et al.*, 2013), enhancing the ability to navigate disruptions and crises effectively (Hartmann *et al.*, 2020).

At the current stage of AI development, GenAI can augment human creativity and foster innovation. However, it cannot develop real resourcefulness. Resourcefulness remains closely tied to identity-related human traits, such as empathy, sentiment, emotions, and intuitive and emotional intelligence. Thus, we argue that resourcefulness is rooted in the human-centric space.

4. Potential interrelations among automation, augmentation and human-centric spaces

We build our conceptual framework on a dialectical approach, arguing that AI and human intelligence are "both contradictory and interrelated" (Smith and Lewis, 2011, p. 387). We conceptualize firm resilience micro capabilities as developing within distinct spaces—automation, augmentation, and human-centric—that should not be understood as static or fixed.

Building on this premise, our framework explicates the mechanisms through which these interrelate continuously. While the mechanisms described below are analytically distinct, they do not imply a linear or sequential order; rather, they co-exist and unfold recursively over time. This perspective, represented in Fig. 2, highlights that firm resilience emerges from the ongoing interrelation among automation, augmentation, and human-centric spaces. The underlying mechanisms reshape the relative weights of these spaces, probably without eliminating any. This reflects an ongoing search for a new combination of these spaces in response to both organizational and external changes.

4.1 Interrelations between augmentation and automation spaces

The augmentation and automation spaces interrelate through two mechanisms. Mechanism (A) enables the *reallocation of human time toward higher-order cognitive activities.* Activities initially performed in the augmentation space may become automated over time. For instance,

the development of redundancy and robustness, which initially requires human intervention (e.g., training AI algorithms; Sjödin *et al.*, 2021), can be automated once systems are trained and embedded in organizational processes. Consequently, capabilities developed in the automation space free human time for higher-order cognitive activities (Jarrahi *et al.*, 2023), such as developing of other firm resilience micro-capabilities where human involvement remains essential.

Mechanism (B) concerns *human oversight and monitoring*. It highlights the ongoing need for human validation and recalibration of automated processes. Even when redundancy and robustness develop within the automation space, their effectiveness depends on periodic human intervention. Accordingly, human intelligence remains important in training AI (Sjödin *et al.*, 2021) and monitoring its outputs (Chatterji *et al.*, 2026), ensuring alignment with a firm's evolving strategy (Dagnino *et al.*, 2021).

4.2 Interrelations between augmentation and human-centric spaces

The augmentation and human-centric spaces interrelate through two mechanisms. Mechanism (C) refers to the *improvement of human capabilities through augmentation*. It captures how augmentation enhances human intelligence, particularly through GenAI. While resourcefulness originates in the human-centric space, GenAI supports creativity, ideation, and innovation (Mariani and Dwivedi, 2024). We emphasize these feedback effects, as the development of agility, adaptability, and flexibility in the augmentation space can enhance creativity (Mikalef and Gupta, 2021). In turn, the augmentation space can reinforce the human-centric space.

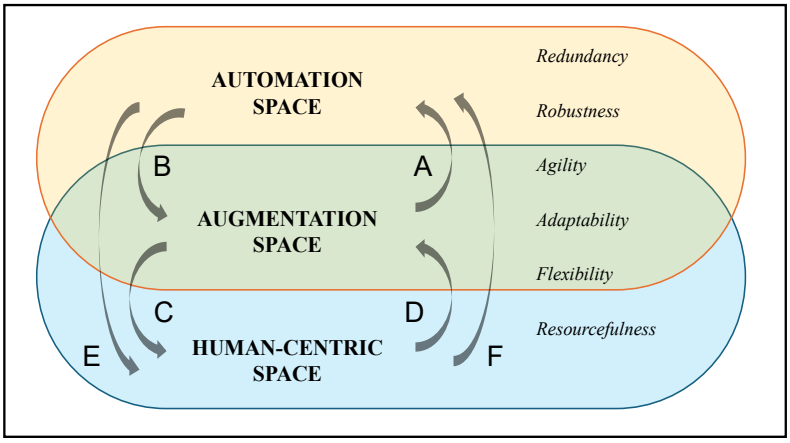
Mechanism (D) involves the *improvement of augmentation through human capabilities*. This dynamic captures how human intelligence enhances augmentation by leveraging human capabilities such as empathy, sentiment, intuition, and emotional intelligence. Thus, the human-centric space reinforces augmentation.

4.3 Interrelations between human-centric and automation spaces

The human-centric and automation spaces interrelate through two mechanisms. Mechanism (E) reflects how the development of resourcefulness in the human-centric space contributes to the *ideation of new processes* aimed at improving firm efficiency through automation. Consequently, the creative orchestration of resources can support the development of redundancy and robustness in the automation space in novel ways.

Mechanism (F) reflects how automation interrelates with the human-centric space by *reallocating cognitive and temporal resources* previously absorbed by routine, data-intensive tasks. As humans are relieved from standardized activities (Jarrahi *et al.*, 2023), they can redirect their efforts toward developing other firm resilience micro-capabilities where human involvement remains essential. In this way, automation indirectly amplifies resourcefulness. This mechanism operates in parallel with Mechanism A.

Fig. 2: Interrelations among the automation, augmentation and human-centric spaces



Source: Authors' elaboration

5. Discussion and conclusion

This study presents a conceptual framework offering a comprehensive understanding of the interrelation between AI and human intelligence within firms for the development of resilience.

5.1 Implications for theory

This study makes three contributions. First, we enrich previous studies on AI by investigating its impact on firm resilience through the dual lenses of automation and augmentation (Raisch and Krakowski, 2021). We argue that robustness and redundancy should develop through automation, as the most valuable resources for value creation within firms are human knowledge, capabilities, and time, which are scarce resources. Accordingly, through mechanisms such as "reallocating human time toward higher-order cognitive activities" and "reallocating cognitive and temporal resources," human intelligence can focus on resilience capabilities that automation cannot currently achieve. Redundancy and robustness should be developed through automation, as these micro-capabilities rely on large datasets and predictive algorithms, areas in which AI outperforms humans (Krakowski *et al.*, 2023).

Therefore, we propose that the development of firms' resilience micro-capabilities should align with the respective strengths of AI and limitations of human intelligence and vice versa. Capabilities based on AI's strengths and human weaknesses (such as redundancy and robustness) should develop in the automation space. Conversely, capabilities rooted in human strengths (such as resourcefulness) and AI's limitations should develop in the human-centric space. This does not imply that these capabilities cannot be augmented. However, developing redundancy and robustness

through augmentation consumes human time, which is a scarce resource. This time-based reasoning applies to the development of redundancy and robustness rather than resourcefulness, which pertains to capabilities currently beyond the reach of AI. Thus, integrating AI into firms requires holistic organizational restructuring (Bresnahan, 2021) and automating activities where human involvement adds little value (Krakowski *et al.*, 2026).

Second, we contribute to the literature on the antecedents of firm resilience by clarifying the role of AI. Specifically, automation, augmentation and human-centricity provide insights into how firms can harness both AI and human intelligence to mitigate exogenous shocks. From this perspective, we complement existing multi-level and multi-theoretical approaches (Aversa *et al.*, 2024). Absorptive resilience micro-capabilities appear more closely associated with automation, while becoming less prominent in the context of augmentation and human-centric spaces. By contrast, adaptive resilience micro-capabilities aligns more with human-centric spaces, particularly regarding how humans and AI interact and complement each other.

Finally, we provide a preliminary contribution to the literature on the interrelations among automation, augmentation, and human-centric spaces, focusing on the emergence of resilience capabilities and the mechanisms that shift the balance among these spaces in response to change and the permacrisis.

5.2 Implications for practice

Our findings offer an actionable guide for managers to leverage AI in navigating major exogenous shocks and the permacrisis age (Brown *et al.*, 2023; Conz *et al.*, 2026). We elucidate AI's role in shaping each key micro-capability underpinning firm resilience (Conz and Magnani, 2020), providing managers with insights into strategically enhancing resilience using AI. Our framework offers a conceptual map to support the effective strategic orchestration of human and AI resources across industries. For instance, in industries where balancing redundancy and efficiency is critical (e.g., the automotive industry), managers can address this trade-off within the AI automation space. Additionally, managers may recognize that AI capabilities (e.g., sales probability forecasts) can help mitigate stockout risks and maintain production continuity, enabling firms to develop redundancies such as safety stock without compromising efficiency.

In industries with high demand uncertainty (e.g., fashion or consumer electronics), managers can foster agility within the augmentation space through AI capabilities such as "agile customer co-creation" (Sjödin *et al.*, 2021) and "AI as a vanguard" (Broekhuizen *et al.*, 2023), allowing firms to respond promptly to changing customer preferences.

Finally, managers should recognize the strategic relevance of human resources marked by resourcefulness and diversity, particularly human capabilities such as ego-resiliency (Oshio *et al.*, 2018) and emotional intelligence (Goleman, 1995), as fundamental enablers of firm resilience.

5.3 Limitations and future research opportunities

This study has several limitations that suggest directions for future research. First, the conceptual framework requires empirical validation to assess its practical implications. Future studies across diverse industries could illustrate how the relationship between AI adoption and firms' resilience micro-capabilities varies. Additionally, future research could empirically examine AI's role in addressing the trade-off between redundancy and efficiency.

Second, our framework assumes AI adoption yields exclusively positive effects. While reasonable, this perspective overlooks the "dark side" of AI (Du and Xie, 2021; Cheng *et al.*, 2022) in the context of firm resilience. AI may be implemented in ways that unintentionally undermine resilience, potentially increasing rather than mitigating firms' vulnerabilities. Future research should empirically investigate whether the use of AI might exacerbate exposure to disruptions under certain conditions. In particular, the relationship between AI adoption and firm resilience could be negative, with AI amplifying risks rather than supporting management.

Third, our framework is tied to the current historical period, and the rapid pace of AI development presents both opportunities and challenges for its future relevance. AI is expected to evolve rapidly, giving rise to new forms of augmentation beyond currently expectations. Advancements in GenAI may expand AI capabilities, enabling more sophisticated human-AI interactions and new decision-making processes that could surpass our current framework. While our framework assumes the interrelation among automation, augmentation, and human-centric spaces, emerging technological trajectories (e.g., advanced human-AI symbiosis; Inga *et al.*, 2023) suggest these boundaries may blur. This aligns with perspectives envisioning hybrid forms of intelligence at cognitive or biological levels (e.g., transhumanism). Consequently, the distinction between the three spaces may become less clear and raises questions about whether resilience will continue to emerge through distinct intelligences or through novel hybrid forms. Additionally, our framework positions resourcefulness within the human-centric space, emphasizing uniquely human capabilities such as emotional intelligence, empathy, and intuition. However, recent AI advancements (particularly NLP) challenge this assumption by enabling machines to simulate and, in some cases, convincingly reproduce empathetic responses. Some studies have highlighted the importance of user perceptions of interactions with voice assistants (e.g., Patrizi *et al.*, 2021). This creates a theoretical tension: if AI can simulate human empathy (e.g., in communication or counseling), the boundary between human-exclusive and machine-augmentable capabilities becomes blurred. Consequently, future research should investigate whether emotional intelligence, empathy, and intuition can be partially or fully simulated by AI and identify related implications for firm resilience.

Fourth, future research could address the dynamic nature of our framework by empirically examining the evolving interrelations among its three spaces. Adopting a longitudinal perspective (e.g., in-depth case studies) would allow scholars to capture how these interrelations unfold

and co-evolve over time, providing a finer-grained understanding of the mechanisms underlying automation, augmentation, and human-centricity in shaping firm resilience.

Finally, our framework assumes that firms deliberately harness AI to build resilience. However, AI may operate as an "invisible" team member, mediating communication and influencing decisions without formal recognition (e.g., employees using AI to write messages intended for colleagues). This introduces a new layer of complexity, as AI may reshape interaction patterns and influence the development of resilience micro-capabilities within hybrid forms of teamwork. Future research should move beyond deliberate AI use and explore how AI as an "invisible" organizational member can affect firm resilience.

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Original Research Papers

Why is collaborative fashion so fashion? Exploring drivers and barriers through the segmentation of Generation Z users[1]

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Abstract

Framing of the research: *The development of circular fashion, boosted by the sharing economy, has fostered the spread of collaborative fashion platforms (CFPs), which offer alternatives to the traditional buying model (e.g., second-hand, rental, vintage).*

Purpose of the paper: *This study aims to explore Generation Z actual and potential users of CFPs, focusing on the motivations that play a role in influencing them. Consistently the research aims to segment Generation Z through the development of a cluster analysis and the identification of different user profiles.*

Methodology: *An online questionnaire was administered to a sample of 387 consumers belonging to Generation Z, in order to collect data about their attitude and behavior concerning CFPs. A cluster analysis was then performed on collected data using the k-means clustering method.*

Findings: *The analysis revealed six clusters: Eco-Sceptics, Green Buyers, Experience Lovers, Digital Shoppers, Indulgent consumers, and Undigitals. The emerged groups of consumers reflect specific drivers and barriers, and the primary and contingent motivations to approach CFPs.*

Research limits: *The main limitation of the study concerns the composition of the sample which may reduce the generalizability of the results. In addition, the cluster analysis methodology might involve a degree of discretion from the researcher in defining and interpreting the emerged clusters.*

Practical implications: *The results offer practical insights for CFPs, allowing them to identify specific targets and tailor marketing strategies based on the characteristics of the different user segments. This can support users' engagement and retention.*

Originality of the paper: *The study outlines the profile of six different clusters of users, based on extrinsic and intrinsic variables, also highlighting how these variables actually act as drivers and barriers in the analyzed sample. In this sense the research goes a step further compared to extant contributions, by focusing on the way these drivers actually coexist and determine the emergence of specific subgroups of consumers. Moreover, the study sheds light on how the variables are related among each other.*

Key words: *sharing economy; cluster analysis; collaborative fashion platforms (CFPs); generation Z*

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1. Introduction

The fashion industry is among the highest impact categories in terms of material consumption, land and water use, and greenhouse gas emissions in Europe (EEA, 2019). At the same time, clothing production is constantly growing, as is the disposal of clothing that has not yet reached the end of its life (Ellen MacArthur Foundation, 2020). In response to these worrisome trends, practices such as upcycling, reuse, repair, and rental, as well as production techniques with renewable and organic raw materials, have started to spread (Tsironis *et al.*, 2023). Taken altogether, these practices refer to the wider concept of circular fashion, where clothes, shoes, and accessories are produced with the intention to contrast the traditional "take-make-dispose" economy model, while ensuring their responsible use for as long as possible and their environmentally safe return to the biosphere right after (Kim *et al.*, 2021). In this context, the emergence of the sharing economy has been seen as a further support to the development of sustainable practices (Arrigo, 2021). Sharing economy refers to a socio-economic system enabling the exchanges of goods and services between individuals and organizations with the goal to increase efficiency and optimization of sub-utilized resources (Muñoz and Cohen, 2017). The boost that the sharing economy has given to circular fashion mostly depends on its ability to connect people through the internet, as the success of these platforms has been enabled by the development of ICT (Rojanakit *et al.*, 2022). Thus, thanks to digitalization, individuals can connect with a virtually unlimited network of other users and exchange a large pool of resources (Frenken and Schor, 2019). The development of circular fashion practices through sharing economy platforms led to the development of collaborative fashion platforms (CFPs) which offer consumers alternative options to the classic purchasing model, providing access to existing clothing and alternative opportunities to acquire individual ownership (gift, exchange, or second-hand purchase) or usage options for fashion products owned by others (sharing, renting, or leasing), (Iran and Schrader, 2017).

Focusing on consumer behavior, despite the closeness with circular fashion, empirical investigations shed light on the fact that sustainable concerns are often considered as a side effect in sharing economy usage, with extrinsic motivations, i.e., economic benefits, being more relevant in driving users towards these platforms (Böcker and Meelen, 2017). This is even more true when focusing on young consumers. Users from Generation Z have recently become the object of investigation concerning consumer behavior in the sharing economy (e.g., Fan *et al.*, 2023) also because of their digital competencies, which make the adoption of these platforms easier compared to older generational cohorts (Surmacz *et al.*, 2024; Maričić *et al.*, 2024). This consumer segment shows a particular affinity with collaborative and co-creative fashion platforms, thanks to values such as sustainability, individuality, digital literacy and active participation in online communities (McKinsey and Business of Fashion, 2020). Specific studies have investigated how individual characteristics, such as fashion leadership, the need for uniqueness and materialism,

can influence the adoption of clothing rental and exchange services, facilitating or hindering participation in collaborative consumption practices (Lang and Armstrong, 2018). Extant literature about Gen Zers' attitude towards the sharing economy stresses the extent to which they are close to sustainability concerns (Hill and Lee, 2012; Aktan and Kethüda, 2023; Surmacz *et al.*, 2024), yet it fails to adequately cover the paradoxical nature of this closeness, particularly in the fashion industry. Generation Z has been largely defined as greener compared to older generations (Anh, 2020), though the individuals it encompasses are the main buyers of fast fashion products (Zhang *et al.*, 2021; Kabaja *et al.*, 2023).

Based on this scenario, this research aims to explore which intrinsic (sustainability, quality, experience) and extrinsic (economic, uniqueness, accessibility) motivations influence actual and potential CFP users among Generation Z. Furthermore, the research aims to segment Generation Z users through the development of a cluster analysis and the identification of different user profiles. To this end, data from 387 Gen Zers have been collected through a self-administered questionnaire aimed at measuring respondents' agreement with a set of motivations related to CFPs. The data were processed using SPSS v.23.0 software and classified via k-means clustering. The six clusters that emerged shed light on specific subgroups of users, namely: *Eco-Sceptics, Green Buyers, Experience Lovers, Digital Shoppers, Indulgent Consumers and Undigitals*, where the investigated dimensions act as drivers or barriers.

From an academic perspective, the originality of this research comes from three key aspects. First, it fills a gap of investigation concerning Generation Z behavior towards the sharing economy, where most studies are focused on older generational cohorts. Moreover, the scope of investigation includes different practices within the fashion industry (i.e., rental commerce, second-hand shopping, vintage shopping) that are traditionally treated separately. Second, compared to extant contributions, the focus is not only on sustainability concerns, but also on a set of different motivations. Third, while previous studies are mostly focused on defining statistical models to assess the weight each variable might have on attitude and behavior, this research offers profiling of clusters of users. This is of great value from a managerial point of view, as the clusters outline potential segments that platforms' managers might target and consistently orient the fine-tuning of their strategies.

The remainder of the paper is as follows: the next section sums up the theoretical background, outlining CFPs typologies and the key drivers that have so far been investigated; the subsequent section describes the adopted methods and the details of the data collection and data analysis processes; the main findings are then described in quantitative and qualitative terms; discussion of the achieved results and conclusive remarks close the paper.

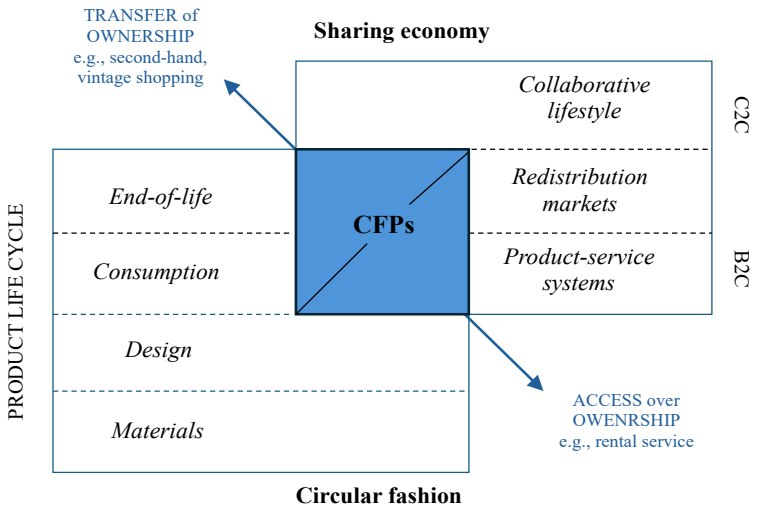
2. Relevant literature

2.1 Sharing practices in the fashion industry

Collaborative fashion platforms (CFPs) combine the concepts of circular fashion and the sharing economy. The former refers to the practices that could ensure a long life and safe disposal of fashion products (Kim *et al.*, 2021). According to Dissanayake and Weerasinghe (2022), circular fashion strategies can be implemented along the four phases of the product life cycle, namely: materials selection, product design, consumption patterns, and end-of-life.

The sharing economy, also referred to as collaborative consumption, implies sharing, swapping, trading, or renting products and services through a digital platform, which entails exchanges among peers or with companies (Botsman, 2013). Botsman (2013) identifies three practices as part of collaborative consumption: collaborative lifestyle, redistribution markets, and product-service systems. Collaborative lifestyle implies the exchange of non-product assets (e.g., space and skills); redistribution markets refer to the online resale of unused or unwanted garments; product-service systems are access-based models where business providers grant long- or short-term access to assets (Botsman, 2013).

Fig. 1: Collaborative fashion platforms typologies



Source: Authors' elaboration

As shown in Figure 1, and consistent with the studies from Park and Armstrong (2017) and Arrigo (2021), CFPs cover two main typologies of practices: (i) access over ownership, which can occur through renting or lending, and (ii) transfer of ownership, which can occur through P2P exchange, donation, and purchase of used goods. Product-service systems are an example of the former. This model involves companies on the provider

side, offering alternatives to traditional clothing purchase and ownership to reduce dependence on natural resources and redundant consumption (Dos Santos *et al.*, 2019). Through Product-service systems, firms can add new streams to their revenue models, for example, by collecting and reselling used clothes (Armstrong *et al.*, 2015). At consumption level, rental commerce is the most widespread example of product-service systems (Dos Santos *et al.*, 2019). With rental commerce, consumers use sharing platforms to access goods temporarily, paying for the experience rather than ownership (Mishra *et al.*, 2021). Consequently, the same garment would be "shared" many times during its lifetime by different consumers, reducing the significant ecological consequences arising from fast fashion and its associated mass marketing activities. Fashion rentals allow for the consumption of high-end brands at discounted prices, thus allocating spending more towards services and leisure experiences (Mishra *et al.*, 2021). Given the benefits, there has been a significant growth in demand for services that offer a non-ownership consumption model (Park and Armstrong, 2017).

The second typology of CFPs implies the transfer of ownership and generally takes place through second-hand shopping to foster end-of-life circularity (Dissanayake and Weerasinghe, 2022). These exchanges have become a popular practice in many countries (Guiot and Roux, 2010; Parguel *et al.*, 2017) and refer to the commercial exchange of pre-owned garments (Kim *et al.*, 2021). This sharing process can positively contribute to counterbalance the enormous consequences emerging from fast fashion and related mass marketing activities (Pantano and Stylos, 2020). Second-hand products are goods previously owned, and their economic value is often lower than that of new products (Roux and Korchia, 2006; Roux and Guiot, 2008; Cervellon *et al.*, 2012; Carrigan *et al.*, 2013). Purchasing second-hand clothing allows for a reduction in excessive garment consumption and waste, promoting the circular development of the clothing economy (Xu *et al.*, 2022). A subset of goods reselling includes the purchase of vintage products (Cervellon *et al.*, 2012). Vintage items are considered those manufactured between the 1920s and 1980s and not necessarily previously used. Vintage products represent a specific period, and their value can significantly increase over time, making them objects of adoration (Sarial-Abi *et al.*, 2017). For these reasons, the search for vintage products takes on the character of a treasure hunt (Cervellon *et al.*, 2012). Vintage enthusiasts enjoy spending time in shops searching for unique items and find the consumption experience enjoyable and thrilling (Amatulli *et al.*, 2018).

2.2 The drivers to CFPs

The sharing economy is often seen as a sustainable practice as it implies the avoidance of possession and/or of purchase with the intent to reduce natural resources (Parguel *et al.*, 2017). However, in addition to sustainability, there are other and different reasons why consumers may engage in these practices.

Focusing on the nature of motivation, extant literature largely drawn on Ryan and Deci's (2000) Self-determination theory (SDT), whose postulated motivators are divided into two categories: intrinsic and extrinsic (McArthur, 2015; Hamari *et al.*, 2016; Alzamora-Ruiz *et al.*, 2020; Minami *et al.*, 2021). Intrinsic motivations emerge from the inherent value or enjoyment derived from the activity, while extrinsic motivations are related to external pressures or outcomes that are separate from the behaviour (Hamari *et al.* 2016). Consistent with SDT, Lee *et al.* (2016) identified economic benefits, enjoyment, affordability, and accessibility of the platform as the main drivers. Hamari *et al.* (2016) identified intrinsic motivations, such as sustainability and enjoyment, and extrinsic motivations, such as economic benefits, as drivers of collaborative consumption. Kim and Yoon (2021) argue that intrinsic motivations, such as enjoyment and sustainability, are stronger than extrinsic motivations, such as economic benefits.

Focusing on the literature on second-hand products, it emerges that they are sought for experiential reasons related to the nature of the offer, such as the originality of the products and, thus, the opportunity to find unusual items that are often not available in a new goods market. The informal and playful atmosphere of some channels also drives consumers to adopt second-hand shopping. Second-hand buyers' motivations are often economic in nature as they meet the need to pay less, have a fair price, bargain hunting, and the rewarding role of price (De Jesus and Mendonca, 2018; Padmavathy *et al.*, 2019; Hinojo *et al.*,2022). Also, environmental awareness, attitudes toward sustainability, and ecological concerns such as recycling and waste reduction are also motivators for second-hand shopping (Guiot and Roux, 2010; De Jesus and Mendonca, 2018; Hamari *et al.*, 2015; Hinojo, 2022). The attraction of price and frugality proves to be two significant drivers for purchasing second-hand goods. This contrasts with vintage items since their price may increase over time and be higher than that of new products (Cervellon *et al.*, 2012). Interest in collecting and wearing vintage is growing, as its unique fabrics and styles attract consumers to shop for second-hand clothing (Palmer, 2005). Vintage consumption is driven simultaneously by psychological and functional factors (Guzzetti and Crespi, 2021). The purchase of vintage items is also motivated by an emotional attachment to an idealized past to which the product belongs, referred to as nostalgia; nostalgia entails a positive preference for the past, involving negative feelings toward the present or the future (Cassidy and Bennett, 2015). Vintage items, often unique pieces, allow individuals to build a distinctive and personal style (Kessous and Valette-Florence, 2019) and express their individuality (Tian *et al.*, 2001; Park and Armstrong, 2017). Vintage goods differ significantly from ordinary second-hand goods. Second-hand products are often perceived as environmentally friendly and economical choices, and in the past vintage clothes were sometimes associated with consumers with less money who could not afford new items (McColl *et al.*, 2013). Today, however, vintage takes on a different cultural and symbolic value defined by quality and stylistic significance. The distinction between second-hand

and vintage, therefore, highlights the need to analyse the specificities and motivations associated with each of these consumption categories.

Rental trade, which is the most widespread example of product-service systems (Dos Santos *et al.*, 2019), has different characteristics compared to the purchase of second-hand and vintage goods. Truong (2010) distinguishes between intrinsic goals, such as the individual need for autonomy, enjoyment, and sustainability, and extrinsic goals, which include economic benefits, fame, possession of luxury goods, and external appearances. The main reason that drives consumers toward short-term access to goods is the possibility of avoiding the expense of new clothes, but, at the same time, the possibility of trying on different outfits, avoiding the problems associated with ownership (Guzzetti and Crespi, 2021). Therefore, the rental concept is more suitable for a younger audience, particularly for those who wish to frequently purchase fashionable clothing to express their identity (Jain *et al.*, 2022). At a wider level, Armstrong *et al.* (2015) argue that PSSs may have environmental drivers, due to the service's ability to increase the use time of clothes by reducing premature disposal, and emotional drivers, including experientiality, satisfaction, and uniqueness that go into this type of purchase. According to the authors, economic benefits and convenience of use are also important drivers. De Jesus and Mendonça (2018) stressed the key role of socio-cultural factors in shaping rental-related collaborative consumption behavior.

As for the generational cohort under investigation, the existing literature on Gen Zers' collaborative fashion consumption does not exhaustively explore all relevant factors and tends to focus mainly on sustainability (e.g., Palomo-Dominguez *et al.*, 2023; Palanichamy *et al.*, 2024). Some studies have considered additional motivations, including economic savings (Slaton and Pookulangara, 2021), achievement of social status (Slaton and Pookulangara, 2021), collectivism and sense of community (Aktan and Kethüda, 2023), convenience and practicality (Bulin et al, 2024), experientiality (Ravikumar *et al.*, 2020; Fondevila-Gascón *et al.*, 2019), exclusivity and uniqueness of experience (McCoy *et al.*, 2021), quality standards and reliability of the garments (Gokhale *et al.*, 2020).

In light of this, the study aims to explore all the motivations that drive current and potential users of Generation Z to use CFP platforms; therefore, the study will consider both intrinsic (sustainability, quality, experience) and extrinsic (economic, uniqueness, accessibility) motivations.

3. Material and method

3.1 Data collection

The purpose of this research is to explore Generation Z motivations towards CFPs and profile them through the development of a cluster analysis. To this end, data were collected through a web-based questionnaire developed using Google Forms. The questionnaire was divided into four main sections. The first three sections presented the same set of questions, applied respectively to rental commerce, second-hand, and vintage items.

These three forms of consumption were chosen as the most representative of the two typologies CFPs are made of: (i) rental commerce as a product-service system based on access over ownership, and (ii) second-hand and vintage shopping as transfer of ownership. The further distinction between second-hand and vintage shopping was made because these practices rely on different motivations, with second-hand being associated with an eco-friendly lifestyle or the need to save money, and vintage shopping with the search for style and individuality. The motivations were investigated in relation to each form of consumption separately. Each section began with a definition of the consumption form under investigation to facilitate the respondents' understanding of the questions. Moreover, questions about frequency and usage mode were also included to better frame the purchasing trends. The questionnaire items were identified in the literature (Annex A) and measured using a Likert scale ranging from 1 to 5 (1= completely disagree, 5= completely agree). The last section of the questionnaire concerns the socio-demographic data of the respondent, including age, gender, education level, occupation, and geographic origin.

Quota sampling was adopted as the non-probabilistic method that comes closest in terms of representativeness to probability sampling (Yang and Banamah, 2014). The sample was constructed from the identification of bachelor's and master's students enrolled at the authors' university. This group constituted the main stratum of the sample. Within this stratum, age-based quotas were defined, selecting only individuals belonging to Generation Z (born between 1997 and 2004). Within the defined quotas, participants were selected according to a random and convenient approach, which was deemed suitable for meeting the research objectives and is therefore widely used in the literature (Turnšek *et al.*, 2020; Gupta *et al.*, 2022). The sample consists of young Italians, belonging to one of the most important markets for the fashion industry, a leading sector of the national economy (Demyanova *et al.*, 2023). In Italy, Generation Z allocates a significant portion of its spending to clothing (Demyanova *et al.*, 2023). The decision to focus on a single country is justified by the fact that consumer attitudes and behavior are strongly influenced by specific social, cultural and economic factors, which also affect the adoption of collaborative fashion business models (Iran *et al.*, 2019; Demyanova *et al.*, 2023). The questionnaire was sent to participants between June and September 2023, collecting 387 valid responses from actual and potential users of CFPs.

3.2 Data analysis

The collected data were processed using a cluster analysis. Since the research aims to segment Generation Z users, cluster analysis was selected because it allows the creation of distinct groups based on shared characteristics (Blashfield and Aldenderfer, 1978). The analysis was performed using SPSS 23.0 software. Due to the high number of variables and the output of the bivariate correlation analysis, a Principal Component Analysis (PCA) was carried out. PCA is a tool to reduce the dimension of a large set of correlated variables, leading to a small set of uncorrelated

variables that still contain most of the information (Johnson and Wichern 2007). The analysis resulted in 12 main variables that could explain 76% of the overall variability across the cases (Table 1).

Tab. 1: Total variance explained

	Initial eigenvalues			Extraction sums of squared loadings		
Component	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
Var.1	20,892	35,410	35,410	20,892	35,410	35,410
Var.2	4,616	7,823	43,233	4,616	7,823	43,233
Var.3	4,244	7,193	50,426	4,244	7,193	50,426
Var.4	2,770	4,695	55,122	2,770	4,695	55,122
Var.5	2,537	4,301	59,422	2,537	4,301	59,422
Var.6	1,905	3,229	62,651	1,905	3,229	62,651
Var.7	1,686	2,858	65,510	1,686	2,858	65,510
Var.8	1,554	2,634	68,144	1,554	2,634	68,144
Var.9	1,337	2,267	70,411	1,337	2,267	70,411
Var.10	1,243	2,107	72,517	1,243	2,107	72,517
Var.11	1,090	1,847	74,365	1,090	1,847	74,365
Var.12	1,047	1,775	76,140	1,047	1,775	76,140

Source: authors' elaboration

The validity of this solution is tested by the KMO measure (.929) and the statistical significance of the Bartlett's test (sig. .000). Then, to perform the cluster analysis, two steps were carried out. First, a hierarchical cluster analysis was performed using the Ward's minimum variance method with squared Euclidean distance measure. The coefficient of agglomeration has then been analyzed to identify the amount of homogeneity that can be observed across the cluster solutions. Consistent with the elbow criterion method, which is based on the error sum of squares as an indicator of residual heterogeneity (Cui, 2020), 4 to 6 cluster solutions could be adopted. To identify the best solution, non-hierarchical clustering processes were applied with 4, 5, and 6 clusters. In particular, the k-means technique was applied, where each observation is associated with the cluster with the nearest mean. A 6-cluster solution was adopted based on the iteration history and the distribution of the cases across the clusters. Moreover, this choice was confirmed by the results of the one-way ANOVA analysis, performed with a Bonferroni post-hoc test, which further tests the reliability and validity of the adopted cluster solution. In fact, as shown in Table 2, the ANOVA results indicate significant differences between groups for all the variable comparisons ($p < 0.001$). The high F-values suggest a strong between-group variance relative to within-group variance, reinforcing the robustness of these differences.

Tab. 2: One way ANOVA test

		Sum of squares	df	Mean square	F	Sig.
Var.1	Between groups	166,157	5	33,231	57,592	,000
	Within groups	219,843	381	,577		
	Total	386,000	386			
Var.2	Between groups	106,437	5	21,287	29,012	,000
	Within groups	279,563	381	,734		
	Total	386,000	386			
Var.3	Between groups	81,693	5	16,339	20,456	,000
	Within groups	304,307	381	,799		
	Total	386,000	386			
Var.4	Between groups	143,531	5	28,706	45,107	,000
	Within groups	242,469	381	,636		
	Total	386,000	386			
Var.5	Between groups	39,986	5	7,997	8,806	,000
	Within groups	346,014	381	,908		
	Total	386,000	386			
Var.6	Between groups	63,541	5	12,708	15,015	,000
	Within groups	322,459	381	,846		
	Total	386,000	386			
Var.7	Between groups	35,843	5	7,169	7,800	,000
	Within groups	350,157	381	,919		
	Total	386,000	386			
Var.8	Between groups	99,358	5	19,872	26,413	,000
	Within groups	286,642	381	,752		
	Total	386,000	386			
Var.9	Between groups	57,990	5	11,598	13,472	,000
	Within groups	328,010	381	,861		
	Total	386,000	386			
Var.10	Between groups	34,658	5	6,932	7,517	,000
	Within groups	351,342	381	,922		
	Total	386,000	386			
Var.11	Between groups	49,585	5	9,917	11,231	,000
	Within groups	336,415	381	,883		
	Total	386,000	386			
Var.12	Between groups	127,814	5	25,563	37,723	,000
	Within groups	258,186	381	,678		
	Total	386,000	386			

Source: authors' elaboration

4. Findings

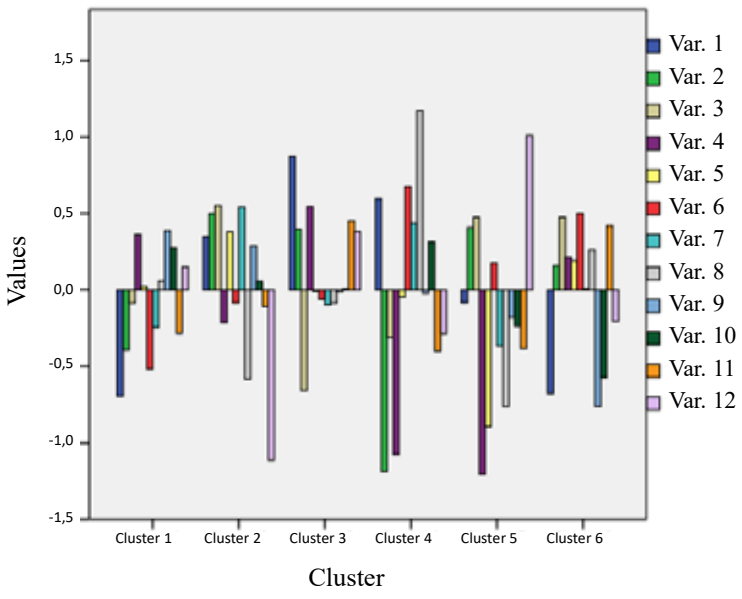
The performed analysis indicated the presence of six clusters of users, which have been labeled based on their main features as: Eco-Sceptics, Green Buyers, Experience Lovers, Digital Shoppers, Indulgent Consumers, and Undigitals (Table 3, and Figure 2).

Tab. 3: Final cluster centers

	Cluster					
	Cluster 1 Eco-sceptics	Cluster 2 Green Buyers	Cluster 3 Experience Lovers	Cluster 4 Digital shoppers	Cluster 5 Indulgent consumers	Cluster 6 Undigitals
Var.1	-,69336	,34890	,87036	,59618	-,08334	-,67657
Var.2	-,39398	,49853	,39727	-1,18502	,40662	,15967
Var.3	-,08579	,54978	-,65819	-,30879	,47465	,47560
Var.4	,36148	-,21375	,54206	-1,07515	-1,20542	,21249
Var.5	,02459	,37900	-,01129	-,04610	-,89284	,19061
Var.6	-,51748	-,08447	-,06128	,67590	,17771	,49939
Var.7	-,24462	,54055	-,09707	,43564	-,36659	,00688
Var.8	,05782	-,58129	-,08583	1,17312	-,76232	,26035
Var.9	,38612	,28759	-,01312	-,02241	-,18134	-,76067
Var.10	,27503	,05585	,00568	,31452	-,23565	-,57218
Var.11	-,28393	-,10828	,45174	-,39995	-,38347	,41844
Var.12	,15136	-1,11291	,38011	-,28525	1,00918	-,20405

Source: authors 'elaboration

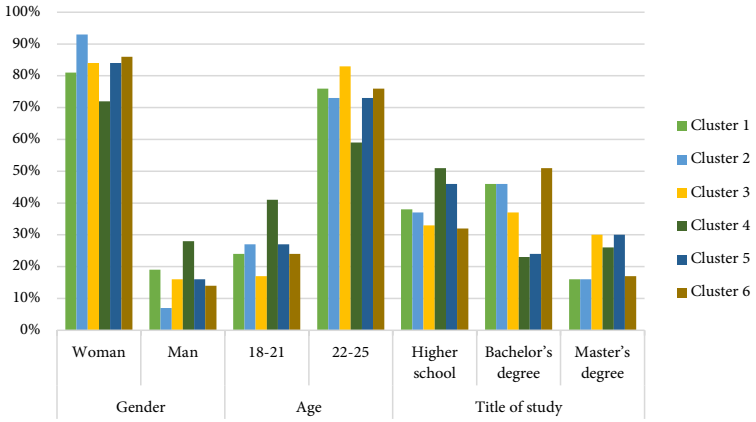
Fig. 2: Final cluster centers bar chart



Source: authors 'elaboration

The overall sample is mostly composed of women (87%), and the age group most covered is 22-25 years (75%). In view of their age, just over half of the sample has a bachelor's degree as their qualification (51%).

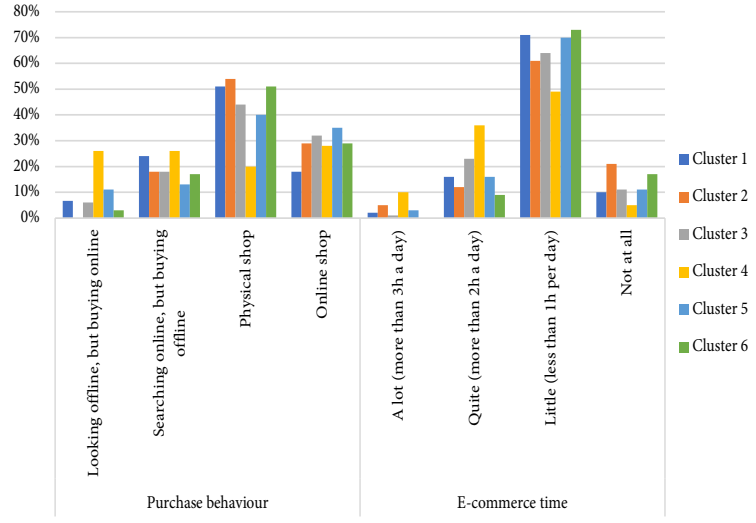
Fig. 3: Socio-demographic aspects of clusters



Source: authors 'elaboration

Figure 4 describes the purchasing behavior of the identified clusters. The sample predominantly prefers physical shops for purchasing. Generally, almost all clusters search online, but then purchase offline. Regarding the time spent on e-commerce, however, the clusters spend little time online (less than one hour per day).

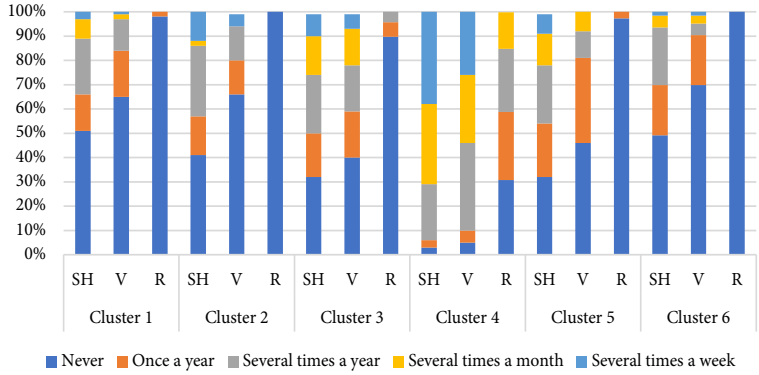
Fig. 4: Clusters' purchasing behavior



Source: authors 'elaboration

The sample considered for the cluster analysis uses more second-hand platforms. A large proportion of consumers also use platforms for vintage products. The use of rental platforms, on the other hand, is low compared to the other practices considered.

Fig. 5: Use of rental, second hand, and vintage



Source: authors 'elaboration

The first cluster is the largest (27%) and groups people who do not use CFPs much. Their use is lacking in both offline and online contexts. The members of this cluster show much disagreement towards the motivations considered in this study, and there is no driver towards which they show agreement; this shows that this is a cluster that does not buy these products much. The main reason why they do not choose these practices is an intrinsic motivation, i.e., sustainability. The cluster shows disagreement with everything related to this variable, to the point of considering it a barrier to purchase. Although these practices are very much associated with sustainability, consumers show their scepticism. Consumers believe that buying second-hand, vintage, or rented products does not help to save natural resources, and, therefore, they believe that it is not a sustainable and environmentally friendly purchasing choice. The results are homogeneous, and this barrier is present in all three practices (second-hand, rental, and vintage). Therefore, considering these characteristics, the cluster was named *Eco-Sceptics*. Although to a small extent, this cluster also disagrees with the quality driver. Consumers believe that these products, besides being unsustainable, do not have high-quality standards and are therefore not reliable in their performance.

The second cluster covers 14% of the sample and groups people who purchase these types of products several times a year, mostly in offline contexts. Differently from the Eco-Sceptics cluster, in this case sustainability is a driver for purchase. Consumers feel that by choosing these products they contribute to saving natural resources. This aspect emerges strongly in all three purchase forms considered in this study (second hand, vintage, rental). For these reasons, the cluster was named *Green Buyers*. In addition to supporting the sustainability driver, this cluster is also in agreement

with the quality driver, considering these products to be of good quality and reliable in their performance. This is a cluster of users who buy these products a lot and the only barrier identified is the experience dimension, towards which the cluster disagrees the most.

The third cluster covers 22% of the sample and consists of users who, similarly to the previous cluster, purchase products several times a year, mostly in offline contexts. Compared to the previous cluster, individuals in this case state that their key motivation lies in the search for experience and uniqueness. Buying these products allows them to have a positive and unique experience, to feel part of a community, and to meet new people with similar interests. Furthermore, these products allow users to express their individuality and a distinctive self-image through products that no one else has. Therefore, this cluster has been called *Experience Lovers*. Although this is the characterising element, the cluster also shows its interest in other motivations, albeit to a lesser extent, such as quality and sustainability.

The fourth cluster covers 10% of the sample and consists of users who purchase second-hand, vintage, or rental products several times a month at physical shops and several times a week on e-commerce. This cluster spends more time on e-commerce websites than any other. The analysis conducted shows that these users believe that the accessibility of these forms of purchasing makes shopping easier and more efficient. Furthermore, they believe that online shopping makes a wide range of products available, facilitating their purchasing process. Considering these characteristics, this cluster was named *Digital Shoppers*. This cluster is also in agreement with the economic driver, as buying second-hand, vintage and rental products on digital platforms is economically advantageous. At the same time, according to this cluster, sustainability has little influence on the adoption of CFPs.

The fifth cluster covers 10% of the sample and consists of users who generally shop both in physical shops and on digital platforms, spending about one hour per day on e-commerce. Individuals belonging to this cluster make a rare use of CFPs, at most once a year, with economic reasons being their key motivation. Users consider the price of these products to be fair and suited to allow for the purchase of a wider quantity of products. For this reason, the fifth cluster has been named *Indulgent Consumers*. The cluster does not consist of strong users, mostly because of experience and uniqueness dimensions with which respondents strongly disagree. Users in this cluster do not feel part of a community by buying new products, and do not believe that by using CFPs they can meet new people with similar interests. Likewise, products do not allow them to feel unique nor enable them to express their personality in a distinctive way.

The sixth cluster covers 16% of the analysed sample and is composed of people who buy more at physical shops, spending little time on e-commerce. Respondents use CFPs very few times, and more than half do not use them at all. The analysis showed that the cluster disagrees with many of the proposed motivations, and, in particular, with online accessibility. The digital platforms on which CFPs are based do not make purchasing easy. Purchasing productivity is not improved by such

platforms. The cluster also disagrees with the possibility that the wide range of products available online can facilitate their purchase. For these reasons, the sixth cluster was defined as *Undigitals*. In addition, users in this cluster avoid purchasing these products because they do not consider them economically advantageous or fairly priced. Cluster analysis shows that the only reason why respondents sometimes turn to CFPs is because they consider them to be sustainable.

Annex B summarizes the characteristics of the clusters.

5. Discussion

The performed analysis revealed the existence of six different clusters of Gen Zers, that differ from each other in terms of motivations towards CFPs. The results confirm, in part, what has already been stated in the literature, namely that Gen Zers aligns itself with values of sustainability, individuality, and digital mastery (McKinsey and Business of Fashion, 2020), but they also highlight, in line with Hill and Lee (2012), the presence of a gap between declared environmental awareness and actual practices, especially in clusters where economic or accessibility-related motivations prevail (Böcker and Meelen, 2017; Hamari *et al.*, 2016). Furthermore, the role of factors such as uniqueness and experience, already discussed by Lang and Armstrong (2018) and by studies on second-hand, vintage, and rental commerce (Guiot and Roux, 2010; Cervellon *et al.*, 2012; Guzzetti *et al.*, 2021), is confirmed in clusters more oriented towards the search for stylistic differentiation and experiential consumption rather than sustainability. Compared to existing literature, this work broadens the focus beyond sustainability alone, integrating the analysis with a complex set of intrinsic and extrinsic motivations and offering a detailed segmentation of Gen Zers in a national context, thus helping to fill a research gap and provide operational guidance for CFP managers.

The value of this output is twofold: as it allows us to reflect on both the clusters and their specific variables, as well as the ways these elements are actually related to one another. A first consideration that is worth making refers to the fact that the three typologies of collaborative fashion (second-hand, vintage, and rental) are mostly considered in the same way by respondents. This means that the perceived drivers and barriers impact the way consumers from Generation Z approach the sharing economy as a whole within the fashion industry, with the exception of slight differences.

Focusing on the six clusters, they can be interpreted in the light of two key variables: the use of CFPs and the intrinsic/extrinsic nature of the motivation. As for the use, four of the achieved clusters (*Green Shoppers, Experience Lovers, Digital Shoppers and Indulgent Consumers*) are actually made of individuals who use CFPs on a higher or lower frequency, yet they are actual users of these platforms. In this regard, cluster descriptions allow us to shed light on those elements that lead the consumers towards the adoption of CFPs. On the other hand, there are two clusters (*Eco-sceptics* and *Undigitals*) that are made of individuals who do not make use of the investigated platforms. As for these clusters, the performed analysis shed

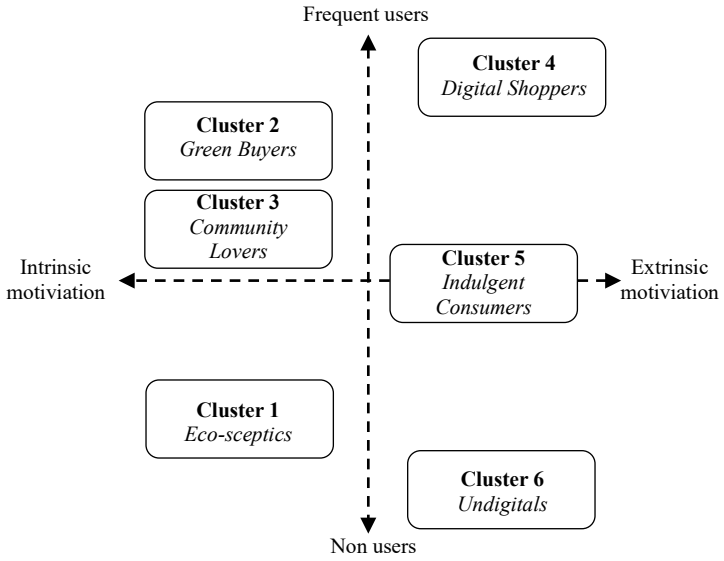
light on those elements that prevent them from using the platforms and thus gaining a deeper understanding of their perceived barriers.

The six clusters can thus be ideally positioned according to the frequency of use and the nature of motivations as described by SDT (Fig. 6). It is interesting to note how the same element can act as a driver for some clusters and a barrier for others, both for intrinsic and extrinsic motivations. In terms of intrinsic motivation, sustainability illustrates the contradiction: while it is a key driver for Cluster 2 (*Green buyers*), it represents the main barrier of use for Cluster 1 (*Eco-sceptics*). This is a non-surprising contradiction that reflects the inner duality of the wider relationship between the sharing economy and sustainability (Grieco and Palagonia, 2024). The opposition between Cluster 2 and Cluster 1 shows two sides of the same coin, as both clusters share Generation Z's characteristic attention to waste, as well as environmental and economic resources. In both clusters, sustainability shapes the formation of attitudes and behavioural intentions towards CFPs, yet in two converse directions.

In a similar way from the extrinsic motivation perspective, the digital nature of CFPs acts as a driver and a barrier at the same time. Accessibility to digital platforms represents a strong purchasing driver for Cluster 4 (*Digital Shoppers*). The focus on the approach to technology characterizes Generation Z, also defined as a generation of digital natives, constantly connected and tied to technological tools. The technological element reinforces the perceived usefulness for consumers, allowing the purchase of products at any time (Lee *et al.*, 2016; Bulin et al, 2024). However, digital platforms also emerge as an obstacle that does not facilitate the purchasing process. For cluster 6 (*Undigitals*), in fact, digital accessibility represents a barrier, witnessing an aspect that goes against the shared trend from Generation Z.

Finally, Cluster 3 (*Experience Lovers*) and Cluster 5 (*Indulgent Consumers*) also appear to be in opposition to each other. The experience and uniqueness dimensions play a driving role for Cluster 3 and represent the main reasons for purchase. Second-hand, vintage, and rental products, in fact, allow consumers to have a pleasurable consumption experience and feel unique by owning items that no one else has (Ravikumar *et al.*, 2020; McCoy *et al.*, 2021). Cluster 5, on the other hand, emerges as being totally indifferent to these dimensions and more inclined towards following current trends to wear what others are wearing. This goes along with the attention to the economic saving, making this kind of user enthusiasts of fast fashion, who meet their key need to cheaply stay in line with trends (Slaton and Pookulangara, 2021).

Fig. 6: Cluster positioning according to use of platform and nature of the drivers



Source: Authors' elaboration

As seen from the description of the clusters, the specific variables coexist to construct and delineate segments' profiles. Users may be motivated or hindered to purchase these products by extrinsic and intrinsic motivations that are often combined or in opposition to each other. The results of the study reveal direct or inverse relationships among the variables that emerge both between and within the intrinsic and extrinsic groups (Fig. 7).

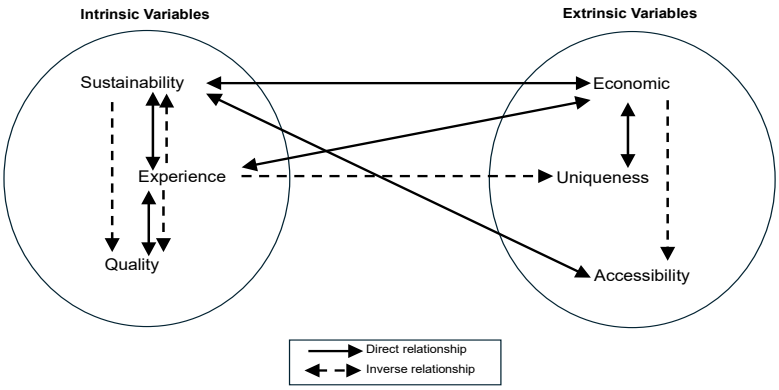
In the case of Cluster 1 (*Eco-sceptics*) and Cluster 2 (*Green buyers*), a relationship emerges between two intrinsic variables (sustainability and quality) that construct the profiles of these two clusters. The relationship here is direct: users who consider sustainability a driver of choice also consider quality an important driver (Cluster 2); similarly, users who disagree with the sustainability driver also disagree with the quality driver (Cluster 1).

In the case of Clusters 3 (*Experience Lovers*) and 5 (*Indulgent Consumers*), an interesting relationship emerges that sets these two clusters in opposition: the direct relationship between experience (intrinsic variable) and uniqueness (extrinsic variable). These two variables combine to define the profiles of clusters 3 and 5. In the first case (Cluster 3), users are both motivated by the search for experience and uniqueness. In the second case (Cluster 5), the two variables both represent barriers to the use of CFPs.

In the case of Cluster 4 (*Digital Shoppers*) and Cluster 6 (*Undigitals*), a direct relationship emerges between two extrinsic variables, accessibility and affordability. When users consider the accessibility of digital platforms positively, they also consider the economic driver positively (Cluster 4). When, on the other hand, users express their disagreement with the accessibility, the disagreement also extends to the economic dimension

(Cluster 6). In the case of these two clusters, it also emerges that in the presence of the accessibility and affordability driver, we witness the absence of the sustainability driver, and vice versa. In other words, consumers either choose CFPs for their sustainability or for platform accessibility and price.

Fig. 7: Relations among the variables emerged from the clusters



Source: Authors' elaboration

6. Theoretical and managerial implications

Several implications can be derived from this study, at both the academic and managerial levels. From an academic perspective, this research adds multiple contributions to the sharing economy field of research. First, it focuses attention on a specific generational cohort, i.e., Generation Z, which has thus far been overlooked. In fact, most studies on consumer behavior in the sharing economy are focused on older generations, and Gen Zers have only recently started to be more closely investigated (Fan *et al.*, 2023). Moreover, compared with exisiting contributions, this research advances the discourse in two main directions. First, it offers an investigation of CFPs, unveiling the dynamics of consumer behavior within a specific industry, taking into account different practices that are usually treated separately (e.g., McCoy *et al.*, 2021; Pham *et al.*, 2021; Palomo-Domínguez *et al.*, 2023). This approach aligns with recent calls in the literature on the sharing economy and consumer behavior for greater attention to both specific target groups and specific industries as key directions for future research in this subfield (Grieco and Palagonia, 2024). Second, it moves beyond the conventional analysis of sustainability concerns within which studies about Gen Zers and sharing economy are usually framed (Palanichamy and Mohanty, 2024; Surmacz *et al.*, 2024).

Furthermore, the study fits into the stream of research about users' motivations, yet compared to extant literature, it pushes the discourse forward as it does not focus on the single drivers which have already been extensively covered in literature (Pham *et al.*, 2021; Slaton and Pookulangara, 2021; Aktan and Kethüda, 2023; Bulin et al, 2024), rather

it uses motivations to build users profiles through cluster analysis. This aspect has been recently raised by scholars, who recognized the strategic importance of different users' profiles in determining equally different consumption practices (Muylaert *et al.*, 2024). Despite nurtured research about consumers' profiles in the fashion industry (e.g., Alevizou *et al.*, 2021), this aspect has yet to be fully focused on in the sharing economy context. Also, the research sheds light on two different profiles of non-users, adding to a topic that has so far been underexamined in prior research and mostly referring to specific geographical contexts (Lang and Zang, 2019; Luo and Park, 2024).

From a managerial point of view, the implications are evident in the research output, where the identified clusters can be interpreted as market segments towards which platform managers can define and/or refine the proper strategies to reach the desired market. This is true both in focusing on users and even more on non-users, to support the implementation of acquisition and conversion strategies. Acquiring a greater knowledge about users' motivations can, in fact, orient managers to understand the elements to stress in the strategic positioning of their platform, in the definition of the value proposition, and the marketing and communications decisions. Although relevant for all the categories of users, it becomes even more interesting to focus on Generation Z, given its purchasing power and the greater access to income comparing to other generations.

7. Conclusion

This study aims to explore Generation Z motivations towards CFPs and to profile them through the development of a cluster analysis. The analysis of collected data led to the identification of six clusters of users and the relationships between motivations.

Although this study provides valuable insights, it also has some limitations, which can be considered as promising avenues for future research. From a methodological point of view, the main limitation lies in the involvement of the student population as the primary respondents to the survey which made the sample mostly composed of individuals with Italian nationality. In this sense, further research could improve the representativeness of the sample, involving respondents from other contexts and countries. Also, comparative analysis with other generational cohorts might reinforce the identification of Gen Zers' specificities. Further research could also examine the influence of cultural norms, dimensions of social acceptance, and social media usage to further explore the behavior of these target users. The cluster analysis methodology could also be a source of limitation, as it implies a margin of discretion for the researchers who perform it. Thus, despite all the measures that have been taken to ensure the reliability and validity of the proposed solution, additional analysis could be helpful in reinforcing the achieved findings. For example, qualitative research could integrate the performed analysis with a more detailed exploration of each cluster, allowing for other possible latent motivations to be explored.

Finally, the study identifies the relationship between extrinsic variables (economic factors, uniqueness, accessibility) and intrinsic variables (sustainability, quality, experience) and the ways these impact the definition of Gen Zers users' profiles. Despite pointing to interesting conclusions about the ways motivations act as drivers or barriers for the different clusters, in the present form these observations lack statistical significance. Future investigation could be oriented towards this aspect to further validate the relations that seem to emerge from the cluster description.

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Annex A: Questionnaire items

Driver	Item	Reference
Sustainability	[CFP] helps to save natural resources (S1) [CFP] is a sustainable consumption mode (S2) [CFP] is eco-friendly (S3)	Hamari *et al.*, 2016
Economic	I can afford more clothes because I pay less when [CFP] (Ec1) With [CFP], I feel like I'm paying a fair price for clothes (Ec2) I don't want to pay more for a piece of clothing just because it's new (Ec3)	Guiot *et al.*, 2010
Uniqueness	[CFP] allows me to express my individuality (U1) [CFP] items allow me to create a distinctive personal image (U2) I hope to come across items that no one else has (U3)	Padmavathy *et al.*, 2019
Experience	[CFP] allows me to belong to a group of people with similar interests (Ex1) Using the products makes me feel part of a community (Ex2) [CFP] is a good way to meet new people (Ex3)	Minami *et al.*, 2021
Quality	[CFP] are reliable in their performance (Q1) I like the design of [CFP]products (Q2) [CFP] have high quality standards (Q3)	Gokhale *et al.*, 2020
Accessibility	[CFP] increases the ease of use in my purchasing ability (A1) [CFP] helps me buy what I want from a wide range of available products (A2) [CFP] increases the ease of use in my purchasing ability (A3)	Padmavathy *et al.*, 2019
Yearly use of [CFP] (offline/online)	Never Once a year Several times a year Several times a month Several times a week	

Annex B: Summary clusters' profiles

Cluster label	Main characteristic	Other characteristics	Purchase Drivers	Barriers to purchase
Cluster 1: Eco-Sceptics	Consumers are very sceptical about the sustainability of these products, to the point of not buying them.	Consumers do not consider products of higher quality.	NA	Sustainability Quality
Cluster 2: Green Buyers	Consumers use CFPs because they see these products as a sustainable and environmentally friendly choice.	Consumers consider the products to be of better quality. Experience could be a barrier to purchase.	Sustainability Quality	Experience
Cluster 3: Experience Lovers	Consumers use CFPs because buying them allows them to have a positive experience and feel unique.	Consumers also consider these products sustainable and of quality.	Experience Uniqueness Quality Sustainability	NA
Cluster 4: Digital Shoppers	Consumers are motivated to purchase these products by the accessibility of digital platforms.	Consumers also consider these products to be cost-effective. However, they do not consider the products sustainable	Accessibility Economic	Sustainability
Cluster 5: Indulgent consumers	Consumers consider products to be cost-effective	Consumers, by buying these products, do not have a positive experience and do not feel unique.	Economic	Experience Uniqueness
Cluster 6: Undigitals	Consumers do not buy these products because they do not find digital platforms accessible.	Consumers consider these products to be economically unviable. However, they recognise their sustainability.	Sustainability	Accessibility Economic

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Green and sustainable supply chain management models in agri-food supply chains: a literature review[1]

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Abstract

Framework of the research: *The escalating interest in addressing the challenges presented by supply chains in terms of environmental and social impact, as reflected in international standards and agendas, calls for a systematic organization of research in this domain which focuses on the models used and the industries investigated.*

Purpose of the paper: *The purpose of this study is to explore and review the wide and interdisciplinary literature published on Green and Sustainable Supply Chain Management models from 2010 to 2023, with a major focus on agri-food supply chains. This paper discusses the evolution of both models and identifies avenues for further research.*

Methodology*: Papers were retrieved from the Scopus and Web of Science databases and subjected to a longitudinal analysis based on descriptive characteristics (i.e. methodologies, TBL pillars addressed, geographical context in which the studies were developed, etc.), and a bibliometric thematic mapping analysis.*

Findings*: The study offers a comprehensive investigation of extant studies on Sustainable SCM and the Green SCM approach, and sheds light on their implementation in agri-food. Firstly, a comparison is made between the agri-food sector and other industries according to the descriptive characteristics identified. Secondly, current motor, niche and emerging themes in agri-food are identified and discussed. Finally, major issues characterizing sustainable supply chain research in agri-food are addressed, with a focus on social sustainability.*

Practical implications: *The study identifies future research directions that may be beneficial for encouraging the adoption of sustainable practices in this industry.*

Research limits*: The main limitation of the study may concern the selection criteria at the basis of the literature review which determined the analyzed corpus.*

Originality of the paper: *The paper combines a content analysis approach with bibliometric techniques to analyze the link between sustainability and food supply chain management, comparing the adoption of Green and Sustainable models and discussing peculiarities unique to the agri-food industry.*

Key words*: sustainable supply chain management; agri-food; systematic literature review; triple bottom line*

1. Introduction

The transition towards sustainable systems has been at the center of the scientific and political debate for many years now, with calls for significant changes at all levels, from governments to companies to societies. One of the biggest challenges facing firms in this regard is the redesign of their supply chain management (SCM) processes (Schrettle *et al.*, 2014) to embed the principles of sustainable development - economic growth, environmental preservation and social equity (Bruntland, 1987; Elkington, 1994). Such practices are not only necessary to maximize efficiency within the supply chain, they are also required to align sustainability goals with sustainability practices. Elkington (2018) highlighted the importance of adopting an integrated approach to fully embedding sustainability at the core of each organizational process along the supply chain. Based on a global study involving 1200 professionals in 97 countries, the 2025 MIT State of Supply Chain Sustainability Report stresses how, in order to achieve their sustainability goals, companies must reorganize their supply chains around four approaches: contractual commitment towards sustainability; providing training or resources along the supply chain; adopting sustainability criteria in the selection of suppliers; requesting third-party audits or certifications to assess internal and supplier sustainability performance (Velazquez Martinez *et al.*, 2025). Considering the new Green Claims directive issued by the European Union, which will require thorough measurement of sustainable performances and third-party certification, ESG requirements for reporting represent a particularly crucial issue for companies operating within a supply chain.

Researchers have been extensively attempting to interpret this ongoing transition and to provide a universal interpretative framework capable of driving companies towards sustainable development while at the same time protecting their stakeholders' interests. A few prevailing models have emerged from this academic debate: contributions on sustainability management are, in fact, mostly attributable to the two main Green (GSCM) and Sustainable SCM (SSCM) frameworks.

Ahi and Searcy (2013) analyzed the different definitions of GSCM and SSCM, concluded that SSCM represents an extension of the former, and proposed a broader and alternative definition, encompassing both frameworks. This perspective has been shared by other authors over the years (e.g. Winter and Knemeyer, 2013; Mitra, 2014) who have proposed methods for integrating socio-economic indicators in GSCM models.

Given the variety and multidisciplinary nature of sustainable SCM contributions, it has become necessary to identify, select and classify the vast array of literature published internationally on this topic, as well as to follow the evolutionary trends of GSCM and SSCM frameworks and identify new research opportunities. Previous literature reviews on GSCM and SSCM have shown how both frameworks have been widely adopted, over the years, in various geographical and sectorial contexts (Rajeev *et al.*, 2017; Mardani *et al.*, 2020), with differences in adoption rate - for example, between mature and emerging economies. In terms of sectors, only a few contributions have focused on the specifics of implementing

these frameworks across industries (e.g. Beske *et al.*, 2014, on dynamic capabilities in the agri-food industry). At a sectorial level, the agri-food industry deserves further attention for many reasons. Despite the substantial increase in global food demand in the last decade, inequalities in terms of distribution across populations are still severe (Accorsi *et al.*, 2019). Such increased demand is also raising the challenge of providing healthy and sustainable diets for today's customers while reducing waste and preserving resources for future generations (Lawrence *et al.*, 2019). It is widely acknowledged that many food production activities have a tremendous impact in terms of their environmental (e.g. land use, deforestation, and water usage) or social (e.g. food crises) consequences, making them crucially important for the achievement Sustainable Development Goals (Agnusdei and Coluccia, 2022). The need to satisfy actual demand through production while preventing resource depletion is also in line with the concept of economic sustainability (Lobo *et al.*, 2015). Finally, the impact of the agri-food industry also extends to the food service industry, multiplying potential sustainability issues at the furthest point of the supply chain. Specifically, the issue of food loss and waste is crucial not only between the different stages of the supply chain but also as concerns the distribution system that interacts directly with consumers (Principato *et al.*, 2023).

To address these challenges and the rapid changes in the dietary habits and preferences of customers, the agri-food industry is therefore witnessing the redefinition of its supply chains, and therefore the need for flexible and sustainable production processes.

With the above in mind, the present study aims to update and extend current literature on GSCM and SSCM by comparing the adoption of both models across industries, with a specific focus on agri-food supply chains. The study aims to:

- analyze the evolution of sustainability management literature in agri-food supply chains, from 2010 to 2023;
- make comparisons between the development of sustainability management models (GSCM and SSCM) in agri-food supply chains and other industries;
- identify relevant topics and new opportunities for future research in the field of sustainability management in agri-food supply chains;
- discuss peculiarities in the adoption of GSCM and SSCM in agri-food supply chains and their implications for researchers and practitioners.

2. Methodology

A systematic literature review methodology was adopted, with a twofold objective: first, to maintain objectivity when selecting papers for our study by limiting the subjective intervention of researchers (Denyer *et al.*, 2003), and second, to efficiently evaluate and investigate broad topics (Tranfield *et al.*, 2003). Sustainability management is, in fact, extensively addressed in literature and comprises a wide variety of multidisciplinary contributions.

Data was collected through the search and selection process proposed by Rajeev *et al.* (2017) and inspired by Mayring (2004) and Seuring and Müller (2008). This sequential procedure consists of multiple steps that allow researchers to identify the most relevant contributions with respect to the objectives of their work.

First, the literature search was conducted on the well-established academic databases Scopus and Web Of Science, ensuring that the most relevant peer-reviewed contributions were considered (Harzing & Alakangas, 2016). The following keywords were used: "sustainable supply chain management", "green supply chain management", "green purchasing", "green design", "green logistics", "environmental purchasing", "green manufacturing", "green supplier selection", "environmental supplier selection" and "sustainable supplier selection". In order to compare studies conducted in the agri-food sector and in other industries, the authors decided to not limit the search by using food-related keywords, enabling them to acquire consistently comparable samples.

The search was limited to peer-reviewed journal articles published in English and took place in July 2023, returning 2313 papers. The authors then refined the dataset by assessing the quality and rigor of the journals to be included. Only well-reputed journals, as per the ABDC/ABS ranking (A or B category journals) or the H-Index and SCImago rankings where necessary, were considered for the study. Priority was given to indexed management journals. Finally, papers focused entirely on topics or domains not pertinent to the investigated managerial context were manually excluded (e.g. design of sustainable technologies, sustainable investing practices). Specifically, papers that investigated the entire supply chain were included while those which addressed aspects that only marginally affect the supply chain and its management (i.e. that only impact one stage of the supply chain or activities that do not directly interfere with supply chain management strategies and operations) were not. At the end of the selection process, 1411 papers investigating economic, environmental and/or social sustainability in supply chains were identified. Of these, 118 papers were concerned with agri-food supply chains and investigated either supply chains in their entirety or specific stages.

The process of content analysis was conducted by defining categories to compare studies (see Seuring and Gold, 2012). Categories were first identified by researchers separately, and then compared to increase the reliability of the analysis (Kolbe and Burnett, 1991). The categories identified by the authors, according to the framework proposed by Durach *et al.* (2017) include: research methods; the geographical area that served as the setting for the study; industry (following the Global Industry Classification Standards); and TBL dimensions and sub-dimensions addressed. Coding was carried out with the support of the qualitative analysis software MAXQDA Analytics, which facilitated the classification of papers and the subsequent longitudinal analyses.

Finally, bibliometric analyses were conducted on the sub-sample of 118 papers concerning agri-food supply chains: for these papers, metadata were retrieved with the following information: 1) authors, 2) year of publication, 3) keywords, 4) category. Alongside descriptive bibliometric

analyses, useful for the identification of trending topics and areas that would benefit from further investigation (Fahimnia *et al.*, 2015), we focused on the thematic mapping of investigated topics. Thematic mapping is a technique that uses keywords to identify emerging and leading thematic areas in a specific field of research (Guo *et al.*, 2017). Thematic mapping uses the co-occurrence of keywords - a type of co-word analysis - for the clustering of studies; the clusters are then framed into a matrix based on their density (which corresponds to the degree of development of a topic) and centrality (the degree of relevance of a topic) (Aria and Cuccurullo, 2017). VosViewer and bibliometrix software was used to support the analysis and visualization process (van Eck and Waltman, 2010; Aria and Cuccurullo, 2017).

For the purposes of clarity, Table 1 below summarizes the methodology stages, from the search and selection of papers to bibliometric analysis.

Tab. 1: Search, selection, coding and analysis stages

Stage	Description	Details
Determination of the primary characteristics of papers to be included	Definition of criteria for inclusion	Peer-reviewed journal articles that were published in English between January 2020 and July 2023
2313 papers		
Data search	Definition of search procedures and keywords	- Cross-selection within SCOPUS and Web of Science with harmonization of the datasets. - Keywords: *sustainable supply chain management, green supply chain management, green purchasing, green design, green logistics, environmental purchasing, green manufacturing, green supplier selection, environmental supplier selection, sustainable supplier selection.* - Selection of contributions published in peer-reviewed academic journals in English.
Data selection	Application of inclusion/exclusion criteria	- Inclusion of papers focusing on sustainability or economic, environmental and social performance applied to supply chains. - Exclusion of articles dedicated to specific and non-managerial issues (e.g. design of green technologies, sustainable investment practices), - Reputation-based selection of journals (A/B categories according to the ABDC/ABD ranking, H-Index and SCImago evaluation)
1411 papers – full sample		
Literature synthesis and coding	Identification of codes and classification criteria	- Research methods - Country or geographical area - Industry - TBL dimensions and sub-dimensions addressed
118 papers – sub-sample of papers concerned with the agri-food sector		
Bibliometric descriptive analysis		Comparison between the full sample and studies developed in the agri-food sector under the abovementioned dimensions.
Thematic clustering analysis		Thematic mapping of topics addressed by studies in the agri-food sector with the goal of identifying under-researched areas of interest.

Source: authors

3. Results

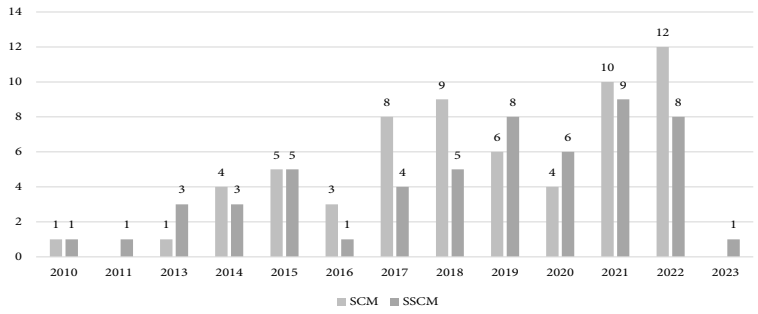
3.1 Evolution of SCM literature (2010-2023): descriptive mapping

Of the 1411 papers identified, 981 (69.5%) used industry data to validate their findings; of these, 39.4% of papers were concerned with manufacturing companies - either industry-specific or not specified. Aside from these, the agri-food sector presented the highest number of papers published (12%), followed by mining and energy production (8.8%) and automotive (8.1%). This is consistent with the attention focused on these sectors by major international organizations. The details on industry-specific studies are provided in Appendix A.1.

Our analysis identified an increasing interest in research on sustainable supply chains in the most recent decade. This general increase was contextual to the development of SSCM as an emerging model and topic, especially since 2013. In all likelihood, the effect of the global commitment to environmental protection was also reflected in researchers' attention toward these issues, since the following years led to the reaffirmation and consolidation of the GSCM model. The presence of SSCM was still marginal in literature from 2010 to 2013 before experiencing a steep growth in subsequent years. In June 2021, the UN conference in Rio de Janeiro not only formalized the commitment to promoting the green economy, it also broadened the concept of sustainability and laid the groundwork for defining the Sustainable Development Goals. This shared blueprint clearly showed how the main challenges in sustainability are actually interconnected, thus indirectly supporting the vision adopted by SSCM, which considers economic, environmental and social aspects simultaneously.

By narrowing down the analysis to agri-food literature, the evolution of publications displayed a more balanced division between types of papers as well as a wider adoption - in proportion - of the SSCM framework (Figure 1). A steep increase in publications can be seen as of 2017; this is consistent with new legislation concerning agri-food supply chains, such as Implementing Regulation EU 2017/1375, to combat grocery retailers' dumping actions towards farmers and other suppliers.

Fig. 1: Sustainability-related publications on supply chain management in agri-food



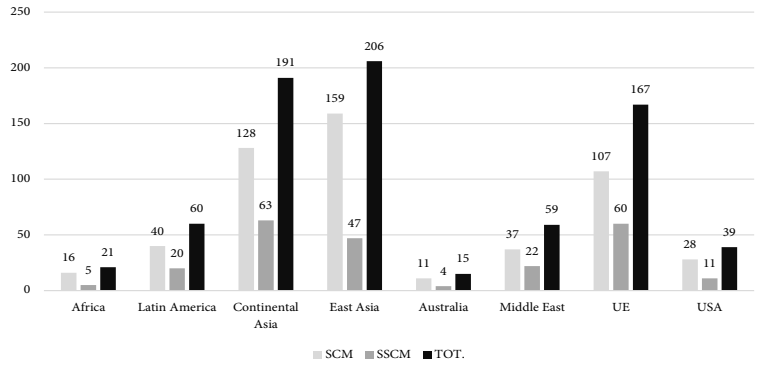
Source: the authors

Papers were also classified according to the methodology adopted by the authors when conducting their research. Most papers were empirical, although they do not always refer to a specific geographical area or industry. This is the case for several mathematical model studies, which are rarely tested empirically using primary data from companies, and surveys. Quantitative models are prevalent, although case studies and interviews and mixed-method studies indicate variety in the empirical validation of theories; proportionally, the latter are well diffused in SSCM literature as they are used to promote virtuous behaviors and successful examples of sustainable management. As regards the agri-food domain, qualitative methods were used in the main, followed by surveys and mathematical models. Qualitative methods include both case studies and interviews, most of which with managers or experts. Their prevalence is connected with the variety of productions being investigated: in fact, many agri-food supply chains present specific features and challenges, which require differentiated approaches and sustainability-oriented managerial practices (Kharola *et al.*, 2022; Leòn-Bravo *et al.*, 2019). Theoretical works developed in agri-food are further addressed in Appendix A.2.

As for the geographical setting, 790 of the 1411 papers on GSCM or SSCM (56%) narrowed their results down to a specific country or area (Figure 2); of these, only 25 were theoretical or literature review studies. This suggests that researchers have been increasingly focusing on the contextual factors - e.g. cultural and political aspects - that could favor or discourage the adoption of sustainable practices. The majority of studies were developed in Eastern Asia (26.1%), followed by the Indian subcontinent (24.2%) and the European Union (21%). Notably, 33 papers address sustainability in supply chain management across countries, with 22 of which comparing Western and Eastern economies. This trend has been growing since 2017, a new area of interest in the study of multinational companies and global supply chains, given the complexities inherent to the convergence of shared environmental and social objectives in drastically different contexts (Koberg and Longoni, 2019).

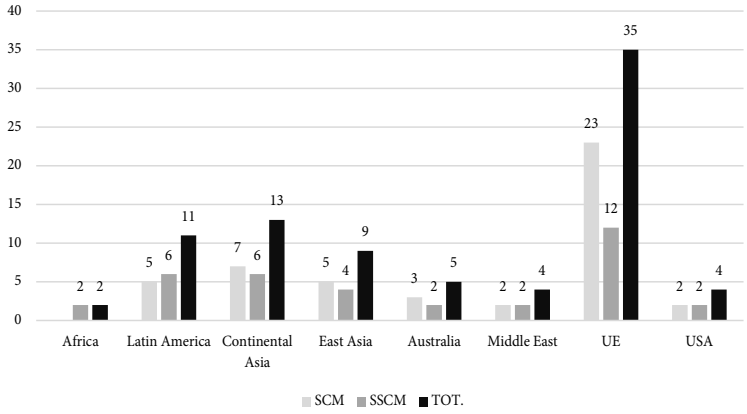
As far as the agri-food sector is concerned, papers with a geographical focus constitute 74.5% of publications. Of these, 35 out of 88 (39.7%) were developed in the European context (Figure 3). Agri-food productions are, in fact, of primary importance for European countries, and most of them also constitute opportunities for international trade. The handful of comparative studies mostly focus on multinational food supply chains (for example, Emberson *et al.*, 2022, compare sustainable supply chains of beef and timber in UK and Brazil). Multinational companies are also developing social projects in developing countries where part of their production is carried out (for example, Gold *et al.*, 2013, discuss case studies on base-of-the-pyramid projects, such as Danone Foods' "micro-factories" supply chain in Bangladesh and Nestlé's Milk Districts initiative in Pakistan). Such investments have a positive impact on social contexts by supporting local farmers and small business owners and providing the population with quality, healthy and affordable food.

Fig. 2: Country-specific studies in sustainable supply chain management literature



Source: the authors

Fig. 3: Country-specific studies in agri-food sustainable supply chain management literature



Source: the authors

A final descriptive aspect concerns the research objects of the studies, their connection with TBL pillars and their combinations (Table 2). Of the 1411 analyzed papers, 509 applied the SSCM framework (36%), while 688 applied the competing GSCM framework (48.7%). The environmental dimension was the most addressed (1303 papers in total), closely followed by the economic dimension (1285). The social dimension was addressed by 593 studies. Although this framework reflects the strong interest of authors in the environmental TBL, it is interesting to note how, in the agri-food sector, the number of publications focused on the SSCM model exceed those dedicated to the GSCM model, which implies that such issues are more pressing in this context.

Tab. 2: TBL dimensions addressed by sustainable supply chain papers

TBL dimension	Definition	N° of papers	N° of papers Agri-food industry
Economic	Production systems that satisfy present consumption levels without compromising future needs (Lobo *et al.*, 2015)	49	3
Environmental	Environment's ecological integrity and carrying capacity, and its continuous support to human life (Brodhag and Taliere, 2006)	81	5
Social	Systems of social organization that cover a wide range of issues, including poverty, human rights, gender equity and equality, public involvement (Farazmand, 2018)	20	1
Socio-economic	Focus on social and economic sustainability	39	4
Socio-environmental	Focus on social and environmental sustainability	25	2
Environmental and economic (GSCM)	Focus on economic and environmental sustainability, corresponding to the Green Supply Chain Management model	688	48
Environmental, social, and economic (SSCM)	Focus on economic environmental and social sustainability, corresponding to the Sustainable Supply Chain Management model	509	55

Source: the authors

3.2 Green and Sustainable Supply Chain Management in the agri-food sector: thematic mapping of investigated topics

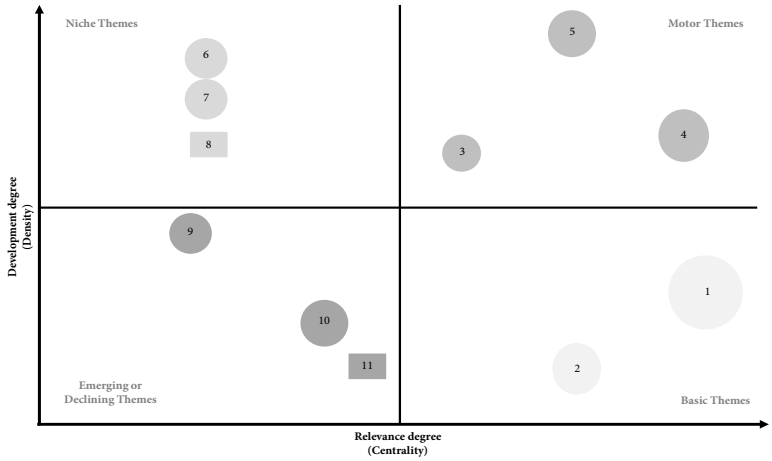
In order to advance knowledge of studies developed in the agri-food sector, thematic mapping based on keywords was applied to the subset of 118 papers. Thematic mapping is a bibliometric technique that allows researchers to classify topics as "basic", "motor", "niche" or "emerging / declining", based on the centrality and density of clusters. Thematic mapping is a way of representing findings that originates from the co-occurrence network analysis which is conducted on bibliometric metadata through clustering algorithms. In the present study, the edge betweenness algorithm applied to keywords identified 11 clusters of topics: details for each cluster are presented in Table 3, whereas Figure 4 shows their distribution according to the centrality/density matrix. The list of papers belonging to each cluster can be found in Appendix A.3. The analysis of the location of topics in the quadrants helps researchers identify the most relevant research trends and opportunities for future research. In this section we discuss each of the clusters, which are labelled using corresponding high-frequency keywords.

Tab. 3: Co-occurrence clusters of high-frequency keywords in the agri-food SSCM field

Cluster number	Keywords	Matrix quadrant	Frequency	Density	Centrality
1	Sustainable supply chain management; food industry; food supply chain; circular economy; food manufacturing; dynamic capabilities; global supply chain	Basic themes	83	47.83	1.23
2	Green supply chain management; environmental management system; operational performance	Basic themes	19	32.93	0.38
3	Supply chain; framework; institutional pressure	Motor themes	12	52.08	0.19
4	Sustainable supply chains; collaboration; eco-innovation; sustainable development; buyer-supplier relationships; standards	Motor themes	15	37.5	0.15
5	Environmental sustainability; green supplier selection; carbon emissions; life cycle assessment (LCA)	Motor themes	24	81.48	0.26
6	Corporate sustainability; retail; sustainable consumption and production	Niche themes	8	75	0.11
7	Data Envelopment analysis (DEA); performance measurement; undesirable outputs	Niche themes	10	68.1	0.15
8	Sustainable supplier selection	Niche themes	5	50.1	0.11
9	Corporate social responsibility; agricultural supply chain; green supply chain	Emerging or declining themes	6	50.2	0.25
10	Sustainable supply chain performance; sustainable performance	Emerging or declining themes	7	40.1	0.17
11	Emerging markets; base-of-the-pyramid	Emerging or declining themes	5	33.3	0.25

Source: the authors

Fig. 4: Thematic mapping of topics in the agri-food SSCM field



Source: the authors

3.2.1 Basic themes

The lower right quadrant comprises topics that are considered very important, even if they appear with relative low frequency. In mature field research, this quadrant includes established topics that have increasingly become less relevant as research progresses, but have the potential to become more relevant again, especially if addressed with innovative perspectives. The two clusters in this quadrant focus, respectively on the two major management frameworks (SSCM in Cluster 1 and GSCM in Cluster 2). Also, it should be noted that GSCM is associated with maintaining consistent operational performance - which is tied to the economic profitability of sustainable actions - and with the development of environmental managerial practices. The topics considered as "established" include the analysis of circular economy systems, the development of dynamic capabilities as relevant to sustainability implementation, and the study of global supply chains.

3.2.2 Motor themes

The upper right quadrant contains research topics with high relevance and high frequency of occurrence, and therefore constitutes the main focus of research in the field. Three research clusters are identified as follows. The first (Cluster 3), is concerned with the analysis and development of frameworks, with two main focuses. On the one hand, studies in this cluster thoroughly examine different production contexts and identify or develop solutions specific to individual supply chains. On the other hand, they also address the institutional pressure on achieving greater sustainability in supply chains with a bigger potential environmental and social impact. Studies in Cluster 4 analyze the topic of sustainable development through the lens of human relationships that lead to collaboration agreements for the definition of standards and innovations. Finally, Cluster 5 is concerned with the environmental pillar, either in terms of waste prevention (i.e. the Life Cycle Assessment approach) or green supplier selection.

3.2.3 Niche themes

The upper left quadrant identifies niche themes, namely topics that appear frequently but are considered less important than motor themes for the advancement of the field. This quadrant includes topics that are very specific in nature and that are being developed vertically. Cluster 6, the first niche area, is dedicated to the final stages of the supply chain, namely the distribution of sustainable products, through retailing and consumption studies. Cluster 7 emphasizes the issues related to performance measurement, specifically through the methodology of Data Envelopment Analysis (DEA) and DEMATEL math models. Finally, Cluster 8 concerns sustainable supplier selection. It is interesting to compare its positioning with that of green supplier selection, which is a motor theme. We posit that sustainable supplier selection research is still a niche area due to the lack of established measures for defining social sustainability criteria.

3.2.4 Emerging or declining themes

Topics in the lower left quadrant have low relevance and frequency of occurrence: these topics can therefore be identified as either declining or emerging, and have to be thoroughly examined. Cluster 9 can be considered a declining theme as it includes topics such as corporate social responsibility and green supply chains, which are well established among studies focusing on supply chain management models (GSCM and SSCM). Conversely, Cluster 10, which addresses sustainable supply chain performance, can be considered as an emerging topic due to the aforementioned need to identify relevant aspects that can improve the social sustainability of productions. Further investigation of this issue will also be able to advance research on niche topics such as sustainable supplier selection, following the definition of crucial social criteria. Finally, Cluster 11 includes all topics concerning emerging markets and base-of-the-pyramid sustainable management practices. Compared to global supply chains, which are a basic theme, a potential shift in research perspectives is identified. Research is in fact moving from the analysis of sustainable practices managed globally by multinational companies - even when they benefit actors in the supply chain situated in emerging countries - to the study of local supply chains and built-in solutions for these socio-economic contexts.

4. Discussion

The present study has presented a summary of the literature on Green and Sustainable Supply Chain Management over 2010-2023, a period that appears to be very dense in scientific works across various geographical and industrial contexts. As part of this study, special focus was paid to the agri-food sector, in terms of recursive dimensions (i.e. type of study and methodology adopted; diffusion of GSCM vs. SSCM models; identification of macro-themes according to the TBL paradigm) and topics of interests. Specifically, following the thematic mapping of topics, literature in the agri-food sector appears to be just as heavily fragmented due to the wide variety of contexts addressed: the supply chains investigated concern global or local/farm-to-table products, but also fresh, processed and/or preserved products. To clarify the thematic structure, clusters were categorized as basic themes, motor themes, and niche themes. The basic themes represent foundational topics frequently addressed across studies, such as environmental sustainability practices. The motor themes include areas that are both highly developed and influential in driving further research, such as HR sustainability and integration of TBL dimensions. The niche themes refer to emerging or less explored topics, such as retailing strategies or sustainable supplier selection. Each cluster has been contextualized with references to prior studies to highlight its significance and links to existing literature.

A call for more research on the generation of new local distribution networks emerges, with particular relevance for emerging markets and

countries, as well as on conciliation between small actors in the supply chain and large-scale producers and retailers. Retailing is still a "niche theme", despite retailers often being the focal firm of agri-food supply chains, which could also promote eco-innovations upstream as well as enhance collaborations among the other supply chain actors. This prioritization is particularly relevant in light of recent supply chain regulations, which increasingly require traceability, sustainability reporting, and compliance with labor and environmental standards. In this sense, it would be relevant to integrate HR sustainable development, which is already a motor theme, with a perspective specifically addressing how HR management can contribute to the dissemination of sustainable culture and operations upstream and downstream.

Another significant insight is that more papers were published on SSCM than on GSCM despite the fact that the social dimension is still understudied - with respect to the environmental and economic dimensions - in the agri-food sector, therefore implying an advancement in addressing social issues. This is unusual since the literature as a whole still heavily addresses GSCM, even if SSCM is a growing field of research. Nevertheless, more studies on social sustainability are called as a major research opportunity in the agri-food sector. This is consistent, for example, with sustainable supplier selection being still a "niche" theme with respect to green supplier selection. In this sense, we identify two main issues to be addressed. The first issue concerns the need to identify objective measures of corporate social risk and social performances and achieve greater effectiveness in their evaluation (Tundys and Wisniewski, 2018). Recent studies (e.g. Malak-Rawlikowska *et al.*, 2019; Arcese *et al.*, 2023) have been trying to identify socially-centered criteria for the self-assessment of companies and for well-informed supplier selection along the supply chain. Nevertheless, most of these works are theoretical or based on mathematical modeling and need to be tested with more field studies on actual supply chains. This is particularly important for the agri-food sector, where many issues are specific to different products. New classifications may therefore be required in order to maintain consistency with such specificities. Furthermore, social goals must be effectively systematized and integrated with pre-existing economic and environmental goals and related measures (Ecer and Pamucar, 2020). One suggested future research perspective is investigating the potential of integration between different TBL dimensions and between GSCM and SSCM models. The second issue arises from the variety of subjects directly benefiting from socially sustainable actions. Environmentally sustainable actions tend to benefit society as a whole - by improving life quality and well-being and by preserving resources for future generations -, whereas socially sustainable ones are designed to fit the interests of a specific target. In the agri-food sector, both the internal members of the supply chains (workers, employees, small independent entrepreneurs acting as suppliers, their families and communities, etc.) and consumers are relevant targets. As regards the former, a wide variety of socially sustainable actions is found. As for consumers, product safety is a core issue that has to be guaranteed along the supply chain, followed by consistent packaging information (Delai and Takahashi, 2013; Acosta *et al.*, 2014). Moreover,

increasing the propensity of customers towards sustainable purchases - and encouraging responsible consumption and nutritional choices - is crucial for driving changes and shifts in agri-food production chains. Due to their visibility and proximity, retailers and large-scale producers should therefore be considered not only as powerful actors in the supply chain but also as influencers and promoters towards customers. From the literature review, it emerges that only a limited number of studies explicitly address the requirements and requests of final consumers in the design of sustainable supply chain management practices, despite the fact that many authors have shown that demand is driving the main shifts in sustainability (Busch and Spiller, 2016; Petljak *et al.*, 2018; Longoni and Cagliano, 2018; Dhaoui *et al.*, 2020). The contribution of food retailers and large producers also involves coordinating the reduction of food waste and loss through the identification of more efficient production systems, on one hand, and new ways of salvaging food on the other (Principato *et al.*, 2023). For details on sustainable social actions, ranked by range and degree of involvement, see Appendix A.4.

Finally, we suggest that there is room for new, cross-sectoral studies. From our analysis, it emerged that extant studies have mostly compared industries (e.g. agri-food vs. automotive). Agri-food supply chains, however, have significant interactions with other supply chains, with implications on the overall impact of the chains themselves. Examples are the chemical industry (fertilizers and veterinary products), the transport and logistics sector, and the hospitality industry - where restaurant and catering services share the need to converge "lean and resource-efficient" production with "local and seasonal" agricultural goods. Highlighting the interaction among these clusters and aligning them with both recent academic findings and regulatory requirements allows the discussion to more clearly reflect practical relevance and scientific contribution.

5. Limitations and future research

The present work is not without limitations. The biggest limitation is the methodology used in the selection of the literature to be reviewed. Having chosen the approach proposed by Rajeev *et al.* (2017), only publications in English taken from A/B journals were selected. Expanding the dataset would have led to the identification of specific, original contexts addressed in papers published in national journals. As such, this could represent another opportunity for future research that could mix an industrial-based approach with the analysis of geographical contexts and countries.

6. Conclusion

In conclusion, the results of this study provide a comprehensive overview of GSCM and SSCM research in the agri-food sector, identifying key themes, fragmentation in the literature, and emerging opportunities for further study. The main contributions include highlighting gaps in social sustainability, emphasizing the strategic role of retailers and large producers, and identifying areas where the integration of TBL dimensions

could strengthen both theoretical and practical outcomes. Overall, the study offers guidance for academics and practitioners who aim to design sustainable supply chain strategies that address multiple dimensions and actors.

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Appendix A. Supplementary Data

Tab. A.1: Sustainability-related publications on supply chain management

INDUSTRY CODING	SCM	SSCM	TOT.
[Papers without a specific industry focus]	256	174	430
Manufacturing industries (multiple)	279	108	387
Materials, mining, energy	54	32	86
Agri-food and wine productions	54	26	80
Luxury, fashion and textile	37	37	74
Transports and logistic services	41	19	60
Electronics	38	12	50
Food retail	13	10	23
Housing and constructions	16	6	22
Chemical	13	8	21
Utilities and communications	15	5	20
Hospitality, catering, tourism	10	8	18
Governmental bodies & NGOs	10	6	16
Healthcare & Pharmaceutical	9	5	14
Papers comparing multiple industries	12	14	26

118 agri-food papers: 80 "agri-food and wine productions", 23 "Food retail", 1 "Comparison"

Tab. A.2: Sustainability-related publications on food supply chain management

Source	Issue and objective of the study	Dimension addressed
Beske *et al.* (2014)	Identify dynamic capabilities related to sustainable supply chain management practices, by conceptualizing supply chains as knowledge-sharing environments. Dynamic capabilities and SSCM practices are integrated as ways to enhance traceability and tracking and to fulfill customer demands.	SSCM
Dania *et al.* (2018)	Investigate the landscape of collaboration behavioural factors in sustainable agri-food supply chain management literature. The study adopts the Resource Dependency Theory while reviewing contributions and identifies 10 key behavioural factors.	SSCM
Govindan (2018)	Identify theories underlying sustainable consumption and production, as well as indicators, drivers and barriers, within the food industry.	SSCM
Nematollahi and Tajbakhsh (2020)	Propose a review on sustainable agricultural supply chains, with a focus on crop-based and livestock sectors that are monitored by eco-social corporate initiatives or government sustainability-driven legislation.	GSCM
Adams *et al.* (2021)	Illustrate the state-of-the-art of food manufacturing operations in sustainable supply chains, through a comparison between SMEs and large multinational companies.	Social & Environmental
El-Bilali *et al.* (2021)	Define the boundaries of the research strand on agri-food systems - that include food supply chains among their elements - in terms of environmental, economic, social and political sustainability dimensions.	SSCM
Palazzo and Vollero (2021)	Identify building blocks and main research directions in food sustainable supply chains, particularly considering the opportunities in neglected emerging countries.	SSCM
Siems *et al.* (2021)	Scrutinize the interlinkage and distribution of dynamic capabilities in sustainable supply chain management literature of two distinctive sectors - food vs. automotive industry - and provide a temporal perspective by comparing two periods.	SSCM
Lwesya and Achanta (2022)	Present research trends in food supply chains in developed and developing countries. The study focuses on changes in food systems due to globalization, urbanization, environmental concerns, new consumption patterns and new technologies.	GSCM
Caccialanza *et al.* (2023)	Systematize management and agriculture literature concerned with the sustainability of the meat supply chain.	SSCM

Tab. A.3: Sustainability-related publications on food supply chain management

Cluster number	Keywords	Papers
1	Sustainable supply chain management; food industry; food supply chain; circular economy; food manufacturing; dynamic capabilities; global supply chain	Pullman and Dillard (2010); Beske *et al.* (2014); Christ (2014); Grimm *et al.* (2014); Chkanikova (2016); Colicchia *et al.* (2016); Tidy *et al.* (2016); Sgarbossa and Russo (2017); Varsei *et al.* (2017); Postacchini *et al.* (2018); Silvestre *et al.* (2018); Gruchmann *et al.* (2019); Nematollahi and Tajbakhsh (2020); Adams *et al.* (2021); Kuchler and Herzig (2021); Nunes *et al.* (2021); Siems *et al.* (2021); Vandchali *et al.* (2021); Guimaraes *et al.* (2022); Mahroof *et al.* (2022); Mastos and Gotzamani (2022); Mastos *et al.* (2022); Palazzo and Vollero (2022); Tseng *et al.* (2022b); Le (2023); McLoughlin *et al.* (2023); Munch *et al.* (2023)
2	Green supply chain management; environmental management system; operational performance	Savino *et al.* (2015); Bala *et al.* (2017); Kirilova and Vaklieva-Bancheva (2017); Sharma *et al.* (2017); Longoni and Cagliano (2018); Banasik *et al.* (2019); Kumar *et al.* (2019); Trivellas *et al.* (2020); Maaz Mam-Ahman *et al.* (2022); Zhang *et al.* (2022)
3	Supply chain; framework; institutional pressure	Grekova *et al.* (2014); Leigh and Li (2015); Montoya-Torres *et al.* (2015); Signori *et al.* (2015); Sayed *et al.* (2017); Rajabion *et al.* (2019); McLoughlin and Meehan (2021); Naderi *et al.* (2021); Tapia-Ubeda *et al.* (2021); Shahzad *et al.* (2022)
4	Sustainable supply chains; collaboration; eco-innovation; sustainable development; buyer-supplier relationships; standards	Touboulic and Walker (2015); Li *et al.* (2016); Brennan and Tennant (2018); Dewick and Foster (2018); Carmagnac and Carbone (2019); Glover, (2019); Perez-Mesa *et al.* (2019); Do Canto *et al.* (2021); Chkanikova and Sroufe (2021); Gloet and Samson (2022); Lwesya and Acantha (2022); Tseng *et al.* (2022a)
5	Environmental sustainability; green supplier selection; carbon emissions; life cycle assessment (LCA)	Govindan *et al.* (2017); Banaeian *et al.* (2018); Shi *et al.* (2018); Pelton (2019); Phochanikorn and Tan (2019); Manocha and Srai (2020); Misopoulos *et al.* (2020)
6	Corporate sustainability; retail; sustainable consumption and production	Delai and Takahashi (2013); Validi *et al.* (2014); Berning and Venter (2015); Frostenson and Prenkert (2015); Sehnem and Oliveira (2017); Dhaoui *et al.* (2020); Silva *et al.* (2022)
7	Data Envelopment analysis (DEA); performance measurement; undesirable outputs	Hadiguna and Tjahjono (2017); Badiezadeh *et al.* (2018); Phochanikorn and Tan (2019); Chand and Tarei (2021); Do and Huang (2022); Izadikhah *et al.* (2022); Vaez-Ghasemi *et al.* (2022)
8	Sustainable supplier selection	Acosta *et al.* (2014); Zhou and Xu (2018); Liu *et al.* (2019); Brix-Asala *et al.* (2021); Emberson *et al.* (2022)
9	Corporate social responsibility; agricultural supply chain; green supply chain	Soler *et al.* (2010); Sharma *et al.* (2015); Ali *et al.* (2017); Bayne *et al.* (2019); Manikas *et al.* (2019); Naseer Maur *et al.* (2019); Packer *et al.* (2019); Li and Zhu (2020); Deng *et al.* (2021); Hu and Li (2022)
10	Sustainable supply chain performance; sustainable performance	Erol *et al.* (2011); Genovese *et al.* (2017); Petljak *et al.* (2018); Zaid *et al.* (2018); Pohlmann *et al.* (2020); Khan *et al.* (2021); Yontar and Ersoz (2021); Yang *et al.* (2021)
11	Emerging markets; base-of-the-pyramid	Gold *et al.* (2013); Gomez-Luciano *et al.* (2018); Pakdeechoho and Sukhotu (2018); Seuring *et al.* (2019); Liu *et al.* (2021); Le *et al.* (2022a); Le *et al.* (2022b); Singh and Srivastava (2022)

Tab. A.4: Socially sustainable actions in agri-food supply chains

INDIVIDUAL COMPANY IN THE SUPPLY CHAIN	- Workers' average annual training time - Annual number of applied innovative ideas generated by employees - Annual personnel turnover - Annual number of recordable incidents with respect to harassment and violence - Annual number of recordable accidents	Erol *et al.* (2011); Kirci and Seifert (2015); Liu *et al.* (2019); Brix-Asala *et al.* (2021); Mastos and Gotzamani (2021); Naderi *et al.* (2021); Singh and Srivastava (2022); Tseng *et al.* (2022a)
	- Gender diversity - Inclusion and hiring policy for vulnerable population	Erol *et al.* (2011); Delai and Takahashi (2013); Acosta *et al.* (2014); Sgarbossa and Russo (2017); Brix-Asala *et al.* (2021); Mastos and Gotzamani (2021); Naderi *et al.* (2021)
	- Avoidance of exploitative forced and child labour	Bastian and Zentes (2013); Acosta *et al.* (2014); Brix-Asala *et al.* (2021); Mastos and Gotzamani (2021); Emberson *et al.* (2022); Singh and Srivastava (2022); Tseng *et al.* (2022a)
	- Effectiveness of personnel recruitment, selection and training - Employees' sensitivization on human rights - Externalities in terms of new employment possibilities	Erol *et al.* (2011); Delai and Takahashi (2013); Berning and Venter (2015); Sgarbossa and Russo (2017); Zhou and Xu (2018); Silva *et al.* (2020); Mastos and Gotzamani (2021); Singh and Srivastava (2022)
	- Organization's openness to stakeholder involvement in decision making - Structured CSR policies or programs with stakeholders, involving all management levels	Erol *et al.* (2011); Acosta *et al.* (2014); Kirci and Seifert (2015); Pakeechocho and Sukhotu (2018); Zhou and Xu (2018); Carmagnac and Carbone (2019); Gruchmann *et al.* (2019); Packer *et al.* (2019); Pohlmann *et al.* (2020); Silva *et al.* (2020); Mastos and Gotzamani (2021); Gloet and Samson (2022)
RELATIONS BETWEEN MULTIPLE ACTORS IN THE SUPPLY CHAIN	- Fair trade with all participants in the supply chain and avoidance of one-sided dependencies or insolvencies in the chain - Avoidance of non-compliant business practices throughout the supply chain (e.g. bribery, intimidation and price agreements)	Bastian and Zentes (2013); Delai and Takahashi (2013); Signori *et al.* (2015); Touboulic and Walker (2015); Chkanikova (2016); Gomez-Luciano *et al.* (2018); Pakeechocho and Sukhotu (2018); Pohlmann *et al.* (2020); Brix-Asala *et al.* (2021); Mastos and Gotzamani (2021); Vandchali *et al.* (2021); Singh and Srivastava (2022)
	- Payment of fair and adequate wages for all workers in the supply chain - Freedom of association and protection of rights to organize and to bargain collectively for all workers in the supply chain	Bastian and Zentes (2013); Delai and Takahashi (2013); Acosta *et al.* (2014); Stiller and Gold (2014); Signori *et al.* (2015); Pakeechocho and Sukhotu (2018); Zhou and Xu (2018); Pohlmann *et al.* (2020); Mastos and Gotzamani (2021); Singh and Srivastava (2022); Tseng *et al.* (2022a)
	- Normalization of prices towards farmers, so that they are not affected by commodity prices over the year - Premium, above-average prices paid for organic products - Long-term contracts and commitments for improvements along the supply chain - Reward-and-incentive systems and cross-insurance mechanisms - Active training and alignment of sustainable goal with suppliers	Pullman and Dillard (2010); Stiller and Gold (2014); Touboulic and Walker (2015); Chkanikova (2016); Bala *et al.* (2017); Gomez-Luciano *et al.* (2018); Carmagnac and Carbone (2019); Gruchmann *et al.* (2019); Seuring *et al.* (2019); Fracarolli-Nunes *et al.* (2020); Brix-Asala *et al.* (2021); Vandchali *et al.* (2021); Gloet and Samson (2022)
LOCAL COMMUNITY	- Fraction of total sales invested for social projects; - CSR / social projects developed within the local community	Erol *et al.* (2011); Delai and Takahashi (2013); Acosta *et al.* (2014); Zhou and Xu (2018); Packer *et al.* (2019); Toussaint *et al.* (2021); Le *et al.* (2022)
	- Ensure that farming and production conditions throughout the supply chain do not endanger the health of workers or residents in the area	Bastian and Zentes (2013); Validi *et al.* (2014); Genovese *et al.* (2017); Pakeechocho and Sukhotu (2018); Pohlmann *et al.* (2020); Toussaint *et al.* (2021); Le *et al.* (2022); Tseng *et al.* (2022b)
	- Improvement of social environment in regions of origin, farming areas and production sites (e.g. educational system, health care and food supply for local population	Bastian and Zentes (2013); Gold *et al.* (2013); Carmagnac and Carbone (2019); Packer *et al.* (2019); Pohlmann *et al.* (2020); Toussaint *et al.* (2021); Le *et al.* (2022); Tseng *et al.* (2022b)

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Exploring users' migration from social media to the metaverse: A push-pull-mooring framework analysis [1] [2]

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Abstract

Frame of the research: *The rise of the metaverses is transforming digital social interaction, offering both challenges and opportunities for digital marketing. While prior research has examined the adoption of metaverses for educational and shopping purposes, little attention has been paid to their emerging role as social platforms - and specifically to the factors that drive users to migrate from traditional social media, viewing metaverses as their potential next iteration.*

Purpose of the paper: *To address the gap in current research, the present study combines the Push-Pull-Mooring (PPM) framework with Social Identity Theory to investigate the factors influencing users' switching intentions from social media to the metaverses.*

Methodology: *To test the proposed "Meta Switching Model," a cross-sectional survey was conducted, collecting data from 151 meta-users of Fortnite. The data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM).*

Findings: *Results indicate that perceived usefulness, ease of use, and social identity significantly influence switching intention, whereas - contrary to initial hypotheses - social media fatigue and dissatisfaction were found non-significant.*

Research limits: *The study focuses on a single metaverse platform (Fortnite) and a relatively limited sample. Future research should compare behaviours across different metaverses and cultures, and explore avatar-based identity formation through mixed or neuromarketing methods.*

Practical implications: *Managerially, the findings underscore the importance for marketers of designing immersive experiences that align with the identity dynamics, values, and cultural codes of the communities within the metaverses.*

Originality of the paper: *Applying Social Identity Theory as a mooring factor for the first time, this study shows that migration to metaverses is driven more strongly by identity-based motivations than by dissatisfaction with existing social media. By*

[2] *Acknolegments*
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framing metaverses as socially constructed rather than merely technological spaces, it offers an innovative perspective on digital migration and the evolution of online social interaction.

Key words: *metaverses; social identity; social media discontinuation; switching intention; push-pull-mooring; PLS-SEM*

1. Introduction

At the beginning of this decade, the rapid digital expansion of consumer activities has fostered the emergence of the concept of the metaverse, defined as "*an interoperated, persistent network of shared virtual environments where people can interact synchronously through their avatars with other agents and objects*" (Kim, 2021, p. 142). To emphasise the plurality of this ecosystem, we refer to these environments as "metaverses". These spaces reflect the growing tendency of digital natives to spend significant portions of their lives online, increasingly seeking social, emotional, and symbolic gratification in digital environments (Ameen *et al.*, 2023; Mertala *et al.*, 2024; Wearesocial and Meltwater, 2024).

The transformation of digital interaction through the metaverses calls for a strategic reassessment of marketing practices. The scale of this transformation is underlined by economic projections, which estimate the meta-economy to be worth USD 485.8 billion by 2030 (Statista, 2023). Companies are increasingly embedding metaverse-based initiatives - such as co-creation, gamified storytelling, and virtual influencers - into key stages of the customer journey, as they explore new forms of engagement and brand interaction (Mancuso *et al.*, 2023). By enabling social interaction in shared virtual environments, the metaverses reproduce typical social media features (Kietzmann *et al.*, 2011), while responding to a broader demand for more coherent and meaningful digital social experiences. In this sense, the metaverses may be viewed as a potential evolution of social media (SM), especially as user preferences continue to diversify across different platforms (Wearesocial and Meltwater, 2024).

While academic interest in the metaverses is growing, the current literature has primarily explored adoption in contexts such as online shopping and education (Wang and Shin, 2022). However, little is known about their role as social platforms, and specifically about the factors that may motivate users to switch from traditional SM to the metaverses for social interaction (De Felice *et al.*, 2023). This research addresses this gap by asking the research question: "*What are the key factors influencing users' intention to switch from traditional social media to the metaverses?*".

To answer this question, we employ the Push-Pull-Mooring (PPM) framework (Bansal *et al.*, 2005), widely used to explain consumer switching behaviour. In the present study, push factors capture dissatisfaction with existing SM platforms, pull factors reflect the attractiveness of the metaverses, and mooring factors - drawn from Social Identity Theory (SIT; Tajfel, 1981) - represent social and personal dimensions that may either inhibit or facilitate switching. In fact, we argue for the inclusion of

this identity-based dimension based on the proposition that switching to a metaverse platform may be fundamentally driven by the user's desire to redefine their social identity through a new form of community belonging. Based on this, we develop and empirically test a "*Meta Switching Model*" through a cross-sectional, survey-based methodology.

This study makes two key theoretical contributions. First, it advances understanding of the metaverses as emerging social interaction platforms, examining their potential to supplement or replace traditional SM. Second, integrating PPM and SIT provides a new theoretical viewpoint: beyond just dissatisfaction with existing platforms or the attraction of new features, users may experience an identity-driven digital migration as a means to redefine how they engage with online spaces. Additionally, it offers practical implications for companies aiming to leverage the metaverses as tools for digital marketing and for interacting with their audiences and customers.

2. The metaverses

The prospect of creating a single, unified "metaverse" as a virtual replica of the real world has shifted from a futuristic literary concept to a plausible reality, with profound implications - including for marketing practices. Its evolution has been marked by significant intersections with virtual worlds and their applications in gaming (Papagiannidis *et al.*, 2008), retail (Bourlakis *et al.*, 2009), and social interactions (Schroeder *et al.*, 2001). Recent contributions (Park and Kim, 2022; Yoo *et al.*, 2023; Aiolfi and Luceri, 2024) reveals the following features of the metaverse: a) it is a three-dimensional digital environment that is interoperable, persistent, and continuously accessible; b) it constitutes a globally decentralised platform without specific jurisdictional constraints regarding data sharing, based on a technological infrastructure that enables the ownership of non-replicable virtual objects; c) it is accessible - though not exclusively - through technologies that facilitate high levels of immersion (e.g., head-mounted displays); and d) it is navigable through digital representations known as avatars, which allow interaction with other users and the environment.

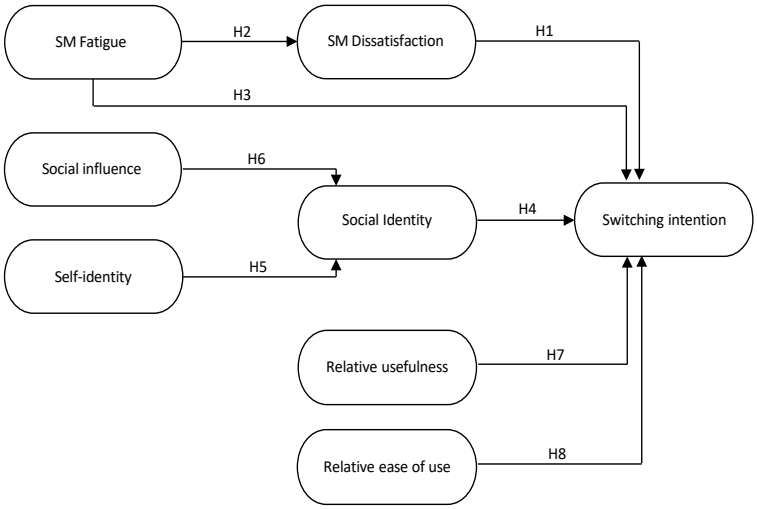
However, the current state of technology makes metaverse-related applications not yet fully usable or accessible to the general public, thereby limiting their overall adoption levels. Nonetheless, a multitude of metaverses are available (Yoo *et al.*, 2023) which, in various configurations and to differing extents, incorporate the features outlined above. The application domains of the metaverses vary considerably; indeed, the academic literature identifies three distinct categories of these virtual spaces: a) industrial metaverses, employed by companies to optimise prototyping and testing phases through the creation of digital twins (Wang *et al.*, 2024); b) corporate metaverses, designed to support internal collaboration among employees (Kumar *et al.*, 2023); and c) consumer metaverses, aimed at end-users and offering immersive experiences and novel dimensions of social interaction (Kshetri and Dwivedi, 2023). This latter category is the specific focus of this study and is referred to as "metaverses" herein.

The metaverses redefine virtual engagement by offering environments - accessible with varying degrees of immersiveness - that leverage the hedonic component of online space usage. These new spaces act as novel touchpoints for their estimated global audience of nearly 500 million users, with Europe emerging as the fastest-growing market (Statista, 2023, 2025a), challenging brands and retailers to implement innovative digital marketing practices for managing and monitoring the customer journey. For this reason, the metaverses are considered an evolution of the internet (De Felice *et al.*, 2023), representing a transformation in user-to-user and user-to-brand interaction within digital contexts, thereby extending beyond the boundaries of traditional SM. Accordingly, in online gaming worlds, socialising and meeting new people are activities aimed at more than half of the players within them (Statista, 2025b)

3. Theoretical background and hypothesis development

3.1 Push-Pull-Mooring (PPM) Framework: meta switching model

Fig. 1: Conceptual Model: Meta Switching Model (MSM)



Source: Authors' own work

The PPM framework is a commonly used model for examining the factors that drive consumers' switching behaviours (Bansal *et al.*, 2005). The model was initially designed to analyse the reasons why people choose to migrate from one place to another (push factors), as well as the attractive elements that make a destination more desirable than the place they left (pull factors) (Bogue, 1969, 1977). This "*push-pull*" model was subsequently extended to include social, personal, and contextual factors that could influence the decision to migrate - known as mooring factors (Lee, 1966).

Since its introduction to the marketing field by Bansal *et al.* (2005), the PPM model has been widely utilised to elucidate consumers' switching behaviour, and its efficacy has been corroborated over time. The PPM model has been extensively adopted in studies on social networking sites (Hsieh *et al.*, 2012) and online games (Hou *et al.*, 2011), thereby introducing the concept of cyber migration (Zengyan *et al.*, 2009).

The primary objective of this study is to assess the validity of the proposed PPM-based "*Meta Switching Model*", illustrated in Fig. 1, through a structural equation modelling approach. This model is designed to analyse the factors influencing users' transitions from traditional SM to the metaverses. The following paragraphs present the formulated hypotheses and provide a rationale for each.

3.2 Push Factors

Since the advent of the Internet, SM has become an invaluable tool for individuals to communicate, establish connections, consume, and generate content across various platforms. Ongoing advancements in hardware and computing capabilities have progressively enhanced the user experience within these platforms. Individuals can now exchange a variety of sophisticated multimedia content formats, representing a significant evolution from the basic, text-based communication typical of early blogs. The widespread use of SM has raised concerns about their impact, including increased perceived social isolation (Primack *et al.*, 2017), social anxiety, and loneliness (Wang, 2017).

Despite the continued growth in SM's overall user base (Wearesocial and Meltwater, 2024), recent years have seen a number of users across various platforms contemplating the discontinuation of their SM usage. This may result in temporary interruptions in their activity or even a complete cessation, as exemplified by practices like "*Monk Mode*" - a self-imposed period of heightened discipline and withdrawal from distractions aimed at fostering personal focus and development (Cassidy, 2023). According to a 2024 survey conducted by The Harris Poll (2024), 83% of Gen Z adults have actively tried to reduce their social media usage, and 32% report a desire to be less engaged with them.

Research on SM Discontinuation (SMD) has gained increasing attention due to its relevance to digital marketing efforts. Farooq *et al.* (2023) identified three types of SMD drivers - individual, relational, and platform-specific - highlighting that SMD behaviour can lead to reduced usage or complete withdrawal. Fu and Li (2022) observed that continuance and discontinuance exist on a spectrum of behaviours rather than as polar opposites. Ravindran *et al.* (2014) pointed out that users may take short breaks, moderate their activity, or suspend it entirely.

This study examines discontinuance in both its permanent and temporary forms. The factors contributing to SMD are considered push factors, as they represent motivations for users to disengage. In this context, Social Media Dissatisfaction (SMDISS) and Social Media Fatigue (SMF) were selected.

The decision to utilise SMDISS as the primary push factor is grounded in the well-established concept of dissatisfaction in the marketing literature, with numerous studies demonstrating its impact on the discontinuation of product and service usage.

Accordingly, Fan and Suh (2014) proposed a comprehensive model of technology switching, in which dissatisfaction is identified as a central factor. Furthermore, dissatisfaction is identified as a fundamental trigger within the PPM framework, ensuring a clear understanding of switching intentions related to the specific phenomenon studied (Marx, 2025). Based on the above, the following hypothesis is proposed:

H1: SMDISS positively affects the intention to switch from SM to the metaverses.

SMF is "*a temporary, however systematically triggered, state of fatigue caused by social media use*" (Islam *et al.*, 2020, p. 3). This dimension's negative impact on the SM experience is understandable due to the harmful effects of SMF, which can lead to depression, anxiety (Dhir *et al.*, 2018), and lower academic achievement (Dhir *et al.*, 2019). Fernandes and Oliveira (2024) also showed that specific brand activities on SM, such as excessive branded content, irrelevant posts, and intrusive ads, can trigger SMF, resulting in lurking behaviours and reduced active participation.

Di Domenico *et al.* (2021) suggest that individuals experiencing SMF may be more prone to intentionally spreading misinformation, thereby decreasing the overall quality of the digital environment. This condition can be harmful not only to the individual but also to the wider user community, creating a ripple effect. Additionally, preliminary studies by Zhang *et al.* (2016) and Dai *et al.* (2020) found a link between SMF and dissatisfaction with SM. Based on these insights, the following hypothesis is proposed.

H2: SMF positively affects SMDISS;

The negative effects of SMF can directly lead users to discontinue use, as noted by Zhang *et al.* (2016). Ravindran *et al.* (2014) suggest that experiencing SMF might prompt users to suspend, monitor, or entirely stop their SM activities. Although fatigue generally discourages platform use, it can also specifically drive users to seek other options. Empirical studies across various platforms - mobile apps (Pang *et al.*, 2025), health information systems (Qiu *et al.*, 2026), and traditional social media (Yao *et al.*, 2015) - have supported this link. We expect a similar pattern in metaverse environments, which are considered new virtual spaces for social interaction (i.e., a type of SM) due to their unique interaction features. Based on this, we hypothesise that:

H3: SMF positively affects the intention to switch from SM to the metaverses.

3.3 Mooring Factors

Behaviours and processes arising from group membership have been extensively studied, leading over time to the establishment of SIT (Brown, 1999). The theory defines social identity as "*that part of an individual's self-concept, which derives from his/her knowledge of his/her membership of a social group (or groups) together with the value and emotional significance attached to that membership*" (Tajfel, 1981, p. 255). Early evidence from minimal group studies (Tajfel *et al.*, 1971) indicates that SIT is concerned with how individuals' behaviours, thoughts, perceptions, and emotions are influenced by their attachment to and awareness of group membership. The theory suggests that being part of a social category fosters a "we" identity rather than strictly individualistic tendencies (Stets and Burke, 2000).

During participation in group dynamics, categorisation occurs (Terry *et al.*, 1999), leading to the establishment of boundaries. This process facilitates internal cohesion, including the development of shared beliefs, symbols, and norms, thereby fostering similarity. Simultaneously, it contributes to external differentiation, enabling the group to distinguish itself from others. Another process, self-enhancement (Terry *et al.*, 1999), motivates group members to reinforce elements of internal cohesion. This results in the accentuation of the distinctive attributes of one's group in contrast to those of others.

The construct of social identity has been conceptualised both as a unified whole and as comprising several discernible dimensions. Bergami and Bagozzi (2000) identified three components of social identity: cognitive, evaluative, and emotional dimensions. Moreover, the cognitive dimension arising from the self-categorisation process may apply not only to a single group but to multiple groups simultaneously (Wang, 2017). Social identity plays a pivotal role in understanding user behaviour within virtual communities and environments (Bagozzi and Dholakia, 2002; Jiang *et al.*, 2016).

SIT introduces social stability as the perception that differences in status among groups remain constant (Van Bezouw *et al.*, 2021). When intergroup relations are seen as stable, this can discourage individuals from migrating. The presence of friends, family, and a strong social network in a particular area significantly reduces the likelihood of leaving (Flanagan, 1978). This phenomenon is evident in social media and online gaming contexts, where community belonging, peer pressure, and emotional bonds serve as an "anchor" preventing individuals from departing (Hou *et al.*, 2011; 2014).

However, social identity's influence is not one-sided. SIT also discusses individual mobility, a strategy where people detach from one group to join a higher-status one. According to Karman and Lipowski (2024), brand-switching can be seen as a form of social mobility, occurring when individuals are unhappy with their current consumer group and move to another. In this context, metaverses could offer new platforms for finding relevant communities, especially when traditional social media encourages only passive participation (Dolan *et al.*, 2021).

Given the established link between social identity and user behaviour, it is reasonable to expect that users may p efer metaverses over SM for social interaction, particularly when these environments foster a sense of community and shared participation. Assuming social identity as a unidimensional construct and considering it in its role as a "bridge" toward the use of a new platform, the following hypothesis is proposed:

H4: Social Identity positively affects the switching intention from SM to the metaverses.

Social identity and self-identity are interrelated constructs. While social identity reflects an individual's sense of belonging to a group, self-identity refers to how individuals perceive their self-definition within broader social contexts (Terry *et al.*, 1999; Thorbjørnsen *et al.*, 2007).

In digital environments, including the metaverses, this distinction is crucial as they provide new ways for individuals to showcase and expand their self-identities (Belk, 2013). Users exert considerable control over their digital personas through various forms of expression - such as customising avatars and engaging in social activities - thereby actively shaping their online experiences (Dwivedi et al 2023).

This act of self-extension shows how identity processes support the formation of emotional commitment and a collective mindset, both of which underpin the creation of a social structure (Burke and Stets, 1999). Consistent with this, prior research shows that self-identity can reinforce social identity, particularly within virtual communities where personal engagement is closely linked to group affiliation (Cheng and Guo, 2015).

Thus, the ability to establish a clear self-identity can act as a precursor to the formation of a robust social identity. Accordingly, the following hypothesis is proposed:

H5: Self-identity positively affects social identity.

Social influence - also referred to as "subjective norm" or "social norm" - is a core construct in several established models, including the Theory of Planned Behaviour (Ajzen, 1991), the Unified Theory of Acceptance and Use of Technology (UTAUT), and UTAUT2 (Venkatesh *et al.*, 2003, 2012). It reflects the extent to which individuals perceive that important others expect them to perform a given behaviour. While social influence has been shown to effectively predict usage intentions in various contexts (Handarkho and Harjoseputro, 2020; Wang and Shin, 2022), other studies suggest that its effects may be mediated by social identity. For instance, Jiang *et al.* (2016) demonstrated that social influence can shape intentions through identity-related mechanisms, and Thorbjørnsen *et al.* (2007) similarly found an indirect effect via social identity expressiveness. Based on this, the following hypothesis is proposed:

H6: Social influence positively affects social identity.

3.4 Pull Factors

Pull factors within the PPM framework refer to the attributes of a new product or service that attract users and encourage switching behaviour (Bansal *et al.*, 2005). In the context of information systems, Davis (1989) identified perceived usefulness - the degree to which a user believes that using a system enhances his/her performance - and perceived ease of use - the extent to which using the system is free of effort - as key determinants of user acceptance in his Technology Acceptance Model (TAM). This framework has been widely validated across technological domains. For example, Hamari and Keronen (2017) highlighted their predictive value in a meta-analysis on online gaming, while Rauniar *et al.* (2014) applied them to the study of social media usage. Within this study, these constructs are understood as pull factors relevant to users' adoption of metaverse platforms.

Following the approach of Hsieh *et al.* (2012), this study focuses on two relative constructs - relative usefulness and relative ease of use - which compare the metaverses with traditional social media in terms of perceived benefits and usability. In this framework, the utilitarian dimension is specifically tied to users' goals of interaction and participation in digital environments, offering a basis for understanding switching intentions between platforms. In line with this, the following hypotheses are proposed:

H7: Relative usefulness positively affects the switching intention from SM to the metaverses;

H8: Relative ease of use positively affects the switching intention from SM to the metaverses.

4. Methodology

4.1 Measures

An online structured survey was employed, using existing and reliable scales sourced from the literature. Surveys are a widely utilised research tool across disciplines, providing valuable quantitative data on trends, attitudes, and opinions, as well as enabling the identification of correlations between variables (e.g., Lazar *et al.*, 2010). The scales were adapted to align with the dimensions of the proposed study. Participants were asked to indicate their level of agreement or disagreement with each statement using self-anchoring scales, with response options ranging from "*Strongly Disagree*" (value 1) to "*Strongly Agree*" (value 7). Appendix A presents the scales and all items used in the survey.

The survey was piloted on a preliminary sample to identify any issues related to question comprehension or the questionnaire's construction, before its administration to the main sample. Additionally, to minimise response set bias (Perreault, 1975), and to counteract primacy and recency effects (Krebs and Bachner, 2018), and to prevent common method variance, items were presented to respondents in a randomised order.

4.2 Sample and Procedures

The choice of Fortnite is justified as it exemplifies a social-focused metaverse, notable for its substantial influence and high number of monthly active users (Statista, 2023). With a global registry exceeding 650 million accounts, Fortnite sustains a baseline of 1.3 million daily active users, which can increase to 44.7 million during major events. The user demographic is primarily young adult males, with nearly 90% being male and over 80% aged between 18 and 34 (Kumar, 2026).

A self-report questionnaire was administered online by posting the survey link in several Facebook groups dedicated to Fortnite users. Two filter questions ensured participants were actively engaged with Fortnite ("Do you consider yourself part of the Fortnite community?") and SM ("Which of the following social media do you currently use?"). The final sample included 151 participants, with 60.9% male and 37.1% female. Most were aged 26 to 35 years and primarily located in Europe (68.9%) and North America (18.5%). Sample details are provided in the Appendix B.

5. Findings

The analytical procedures employed in this study involved the use of the Partial Least Squares Structural Equation Modelling (PLS-SEM) approach, utilising SmartPLS version 4.0.9.6 to test the hypotheses of the "Meta Switching Model" (Abdi, 2007; Ringle *et al.*, 2024).

The reason behind this choice is that PLS-SEM is well-suited to complex structural models and relatively small samples, where it maintains higher statistical power than covariance-based methods (Chin, 2009; Sarstedt *et al.*, 2022). Furthermore, PLS-SEM was preferred for its prediction-oriented approach (Chin, 2009; Sarstedt *et al.*, 2022).

Tab. 1: Results of Measurements

Construct	Cronbach's α	rho_A	AVE	Mean (SD)
SMF	0.789	0.814	0.701	3.42 (1.44)
SMDISS	0.920	0.930	0.808	3.22 (1.61)
INF	0.872	0.880	0.796	2.27 (1.46)
SID	0.782	0.820	0.595	4.37 (1.37)
SELF	0.785	0.824	0.821	2.67 (1.73)
USE	0.889	0.898	0.817	3.79 (1.89)
EOU	0.899	0.907	0.833	3.17 (1.90)
SW	0.857	0.864	0.586	3.89 (1.41)

Source: Authors' own work

To assess the eliability and convergent validity of each construct, the adequacy of individual items and composite measures was evaluated (Dijkstra and Henseler, 2015; Hair *et al.*, 2014; Henseler *et al.*, 2015). Items that did not meet the factor loading threshold of 0.70 were excluded. The final measurement model is reported in Tab. 1, demonstrating satisfactory

results in terms of both convergent and discriminant validity, as evidenced by factor loadings, rho_A, and average variance extracted (AVE). Factor loadings are either above or very close to the 0.70 benchmark. Cronbach's alpha and rho_A values exceed the established threshold of 0.70, indicating internal consistency reliability (Dijkstra and Henseler, 2015; Hair *et al.*, 2014). AVE values are all above 0.50, confirming acceptable convergent validity (Sarstedt *et al.*, 2022). The heterotrait-monotrait (HTMT) ratio values, presented in Tab. 2, are all below the 0.85 threshold, indicating discriminant validity (Henseler *et al.*, 2015). Finally, for the common method variance test, all variance inflation factor (VIF) values were smaller than 2.17, well below the threshold of 3, indicating the absence of collinearity issues (Sarstedt *et al.* 2022).

Tab. 2: Heterotrait-monotrait (HTMT) ratio

	SMDISS	EOU	INF	SELF	SID	SMF	SW	USE
SMDISS								
EOU	0.341							
INF	0.106	0.455						
SELF	0.090	0.558	0.567					
SID	0.149	0.307	0.477	0.737				
SMF	0.811	0.289	0.217	0.149	0.168			
SW	0.130	0.567	0.451	0.678	0.685	0.142		
USE	0.165	0.668	0.397	0.590	0.459	0.141	0.612	

Source: Authors' own work

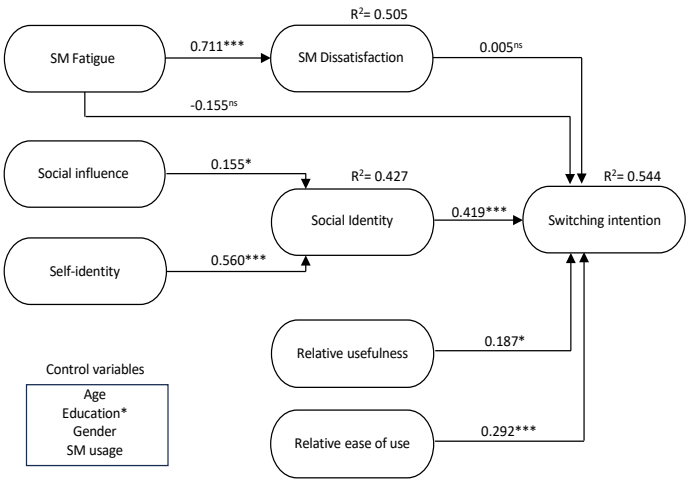
The bootstrap procedure was conducted using SmartPLS software to test the eight hypotheses. Age, education, gender, and the number of SM platforms currently used (serving as a proxy for SM usage) were included as control variables. A total of 5,000 bootstrap samples were employed, and a bias-corrected and accelerated 95% confidence interval was used to assess the model. The results of the path analysis, including all path coefficients and their corresponding significance levels, are summarised in Fig. 2.

The findings indicate that SMF is positively associated with SMDISS ($\beta = 0.711$, $p < 0.001$, $f^2 = 1.022$), thereby supporting H2. In contrast, SMF ($\beta = -0.155$, $p = 0.108$, $f^2 = 0.026$) and SMDISS ($\beta = 0.005$, $p = 0.953$, $f^2 = 0.000$) did not significantly affect switching intention. Therefore, H1 and H3 were not supported. SMF accounts for 50.5% of the variance in SMDISS ($R^2 = 0.505$).

Furthermore, the analysis revealed a positive relationship between social influence and social identity ($\beta = 0.155$, $p = 0.016$, $f^2 = 0.033$), as well as between self-identity and social identity ($\beta = 0.560$, $p < 0.001$, $f^2 = 0.428$), supporting both H5 and H6. These variables explain 42.7% of the variance in social identity ($R^2 = 0.427$).

The results also show that social identity ($\beta = 0.419$, $p < 0.001$, $f^2 = 0.285$), relative usefulness ($\beta = 0.187$, $p = 0.020$, $f^2 = 0.043$), and relative ease of use ($\beta = 0.292$, $p < 0.001$, $f^2 = 0.104$) have a positive effect on switching intention. Overall, 54.4% of the variance of switching intention is explained by the model. Accordingly, hypotheses H4, H7, and H8 are supported.

Fig. 2: PLS-SEM result



Note(s): ***: p-value < 0.001; **: p-value < 0.01; *: p-value < 0.05; ns: not significant

Source: Authors' own work

6. Discussion

6.1 Theoretical contributions

This study validates the applicability of the PPM framework in investigating consumer switching behaviours and their intentions regarding online service usage, further supporting its use, as demonstrated in previous research (Hsieh *et al.*, 2012; Sun *et al.*, 2017). The inclusion of the social dimension has highlighted its impact on user migration, which appears more pronounced than the purely utilitarian dimension - although the latter still exerts a meaningful influence on users' decisions to engage with the metaverses.

Factors like ease of use and perceived usefulness of these platforms for social activities - such as interacting with other users and content - are key drivers in attracting users to the metaverses. These results support earlier research (Hsieh *et al.*, 2012) and highlight the importance of utilitarian reasons in influencing users' decisions to change online services.

Among all variables included in the model, the mooring factor emerged as the most influential in explaining switching behaviour. The presence of social identity within the metaverses - nurtured by self-identity and social influence, as noted by Cheng and Guo (2015) - was shown to be a significant factor in motivating users to migrate from SM to the metaverses. This suggests that the formation of communities within the metaverses plays a crucial role in users' engagement by fostering involvement, a sense of belonging, and the sharing of values, purposes, and goals with other users.

Notably, overall dissatisfaction with SM usage and general fatigue did not significantly affect the intention to switch to the metaverses. This conclusion echoes the findings of Antón *et al.* (2007), who suggest that

other variables (e.g., unfair pricing policies) may be more predictive of switching intentions than dissatisfaction with the service. Nevertheless, this study confirms that fatigue and psychological pressure associated with SM activity do significantly influence user dissatisfaction, a result consistent with the literature on SM discontinuation (Farooq *et al.*, 2023; Fu and Li, 2022).

In summary, the results show that being "unhappy" with current SM doesn't automatically cause people to want to switch platforms. Migration occurs only when a strong alternative is available. In the metaverse context, this shifts cyber-migration research focus to the attraction of new utilitarian benefits and the mooring strength of a new identity or community. Essentially, people migrate because they are attracted to the "new" rather than just fleeing the "old."

6.2 Managerial implications

This research offers valuable insights for businesses seeking to improve their digital marketing strategies, especially those aiming to harness the benefits of the metaverses. Marketers should prioritise the social identity cultivated among meta-users, as it has the strongest impact on switching intentions. Companies wanting to establish a presence in this virtual space must consider the social identities of their target consumers. Within the metaverses, it is crucial to engage with the rituals and communication styles inherent to the platform. As a result, businesses need to develop a thorough understanding of the social processes occurring within these environments.

The diverse use of online platforms can support social listening efforts, helping companies to understand the dynamics of the meta-communities they aim to engage with. This understanding can inform the development of marketing strategies designed to boost community engagement and promote branding activities aligned with the platform's social fabric. To create content that resonates with users' social identities, companies might consider designing virtual experiences, games, and events that reflect the values, interests, and norms prevalent within the platform. Additionally, employing virtual influencers, brand ambassadors, or branded virtual products can further align a company's presence with the culture of the metaverses.

In contrast to the conventional approach of targeting dissatisfied SM users, the findings of this study suggest that platform providers or marketers should avoid using dissatisfaction with the platform as a main strategic focus acquisition. Instead, they should invest in segmenting and identifying the most active SM communities, as they represent a promising target audience. From this perspective, current SM should serve as a strategic gateway to the metaverses, such as by supporting communities within their current digital environments and then providing them with meta-experiences to facilitate their transition. At the same time, companies with a well-developed brand identity and an active online brand community can leverage the metaverses to provide more immersive and differentiated interactions.

The utilitarian dimension remains a critical factor; thus, any proposal for new customer experiences must address both the value of the interactions offered and the ease of use of the environments. It is therefore essential to consider the usability of platforms accessible via Extended Reality technologies (e.g., head-mounted displays), which may still be perceived as complex or cumbersome. Alternatively, proposing new two-dimensional virtual environments accessible via commonly used devices such as smartphones and laptops may represent a viable and more inclusive solution.

7. Conclusions, limitations, and future research directions

The utilisation of the PPM framework facilitates a deeper understanding of cyber migration behaviour, highlighting how consumers navigate the contemporary digital landscape and the role of the metaverses within this evolving environment. The significance of both social identity and the utilitarian dimension offers a substantial explanation for consumer switching intentions towards the metaverses. Nonetheless, further research is needed to clarify the role of discontinued social media usage in shaping consumers' presence on digital platforms.

Practitioners may derive valuable insights from this study to strengthen their strategic presence online, particularly those considering investment in building activities and experiences within the metaverses. This research underscores the importance of fostering a sense of community belonging and delivering a user experience that is both valuable and accessible.

The study suggests that the metaverses have the potential to redefine online interaction by offering environments conducive to community engagement. However, it is important to recognise that Fortnite's unique features may influence the significance of (social) identity factors differently than other metaverses. The presence of multiple platforms within the current metaverse ecosystem highlights the need for further research into their diversity.

Future research should explore how gamification, acting as an attractor in metaverses and possibly absent in traditional SM, influences identity-driven motivations. Investigating these game-like features might lead to new academic conversations about their role in either supporting or obstructing the shift from SM to other digital environments, such as the metaverses. It is therefore recommended that future research explore migration behaviours across various metaverses with different purposes or user demographics, such as Roblox, Minecraft, Decentraland, and Spatial. Such an approach would enable a comparison of user behaviours across different metaverses, rather than relying on a single platform as representative, thereby enhancing sample robustness and generalisability.

Regarding the application of SIT, we recognise two main limitations in this study: first, relying on a unidimensional measure of social identity might have overlooked its multidimensional nature; second, although social identity can be seen as a factor that promotes switching, it can also act as a barrier depending on its importance on the original platform. Exploring

both these aspects together could be a fruitful avenue for future research, examining how these opposing influences affect switching behaviour.

Moreover, investigating the cultural dimensions of users could provide additional insights into variations in social activities within the metaverses, helping to counteract the Western bias present in our sample. While our current sample was sufficient to identify several key factors, it might not have had enough power to detect smaller effects, such as the one observed for SMF (f2 = 0.026). Conversely, the influence of SMDISS was essentially negligible (f2 = 0.000), suggesting it does not impact switching intention in this context, regardless of sample size. Nonetheless, a larger and more diverse sample would help confirm these non-significant paths, improve the overall generalisability of the results, and ensure enough statistical power to establish that "mooring" factors are more influential than "push" motivations among users of various metaverses.

The emphasis on social identity also calls for further exploration, particularly regarding self-identity formation in these environments. As prior research indicates (e.g., Kang and Kim, 2020), the ability to interact in virtual environments via highly customisable avatars can significantly impact self-determination and influence attitudes and behaviours (Silva and Campos, 2024). Studying the role and implications of avatar-based interactions may offer a deeper understanding of key characteristics of emerging virtual worlds.

Additionally, future research should consider the application of neuromarketing tools to deepen understanding of consumer behaviour through the collection of biological data and brain imaging. These techniques can reveal insights into users' mental processes, complementing and clarifying behavioural findings through experimental methods. Finally, qualitative approaches may provide a more nuanced understanding of users' motivations and emotions within the metaverses, enriching the theoretical perspective and informing the development of future empirical studies and conceptual frameworks.

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Appendix

Appendix A - Survey Items

SM fatigue (SMF), adapted from Fu and Li (2022)	
SMF1	I feel tired from my Social Media activities
SMF2	I feel rained from activities that require me to use Social Media*
SMF3	Using Social Media is a strain for me
SMF4	I feel burned out from my Social Media activities
SM Dissatisfaction (SMDISS), adapted from Fu and Li (2022)	
DISS1	I feel dissatisfied about my overall experience using Social Media
DISS2	I feel displeased about my overall experience using Social Media
DISS3	I felt discontented about my overall experience using Social Media
DISS4	I am not delighted about my overall experience using Social Media
Social Influence (INF), adapted from Venkatesh *et al.* (2012)	
INF1	People who are important to me think that I should use Fortnite
INF2	People who influence my behaviour think that I should use Fortnite
INF3	People whose opinions that I value prefer that I use Fortnite
Social Identity (SID), adapted from Tarrant *et al.* (2001)	
SID1	I am glad to be a member of the Fortnite community
SID2	I feel I do not have much to offer to the Fortnite community* (R)
SID3	I regret that I belong to the Fortnite community* (R)
SID4	I am a worthy member of the Fortnite community
SID5	In general, others respect my Fortnite community
SID6	Belonging to the Fortnite community is an important reflection of who I am
Self-Identity (SELF), adapted from Terry *et al.* (1999)	
SELF1	To engage in the Fortnite community is an important part of who I am
SELF2	I am not the type of person oriented to engage in the Fortnite community * (R)
SELF3	I would feel at a loss if were forced to give up the Fortnite community
Relative usefulness (USE), adapted from Hsieh *et al.* (2012)	
USE1	Fortnite helps me be more effective, share information, and make friends better than Social Media
USE2	Playing Fortnite would make it easier to share information and make friends than using Social Media
USE3	In general, using Fortnite is more useful to my life than Social Media
Relative ease of use (EOU), adapted from Hsieh *et al.* (2012)	
EOU1	Learning to play Fortnite would be easier for me than using Social Media
EOU2	It would be easier for me to become skillful at using Fortnite than Social Media
EOU3	I find that Fortnite is easier to use than Social Media
Switching intention (SW), adapted from Gerhart and Koohikamali (2019)	
SW1	I intend to increase my use of Fortnite in the foreseeable future
SW2	I intend to invest my time and effort on Fortnite
SW3	I intend to switch from Social Media to Fortnite
SW4	I am considering switching to Fortnite soon
SW5	The likelihood of me playing Fortnite is high
SW6	I am determined to play Fortnite

(R): reverse coded
*: item dropped

Source: Authors' own work

Appendix B - Socio-demographic characteristics of the sample

Group	Frequency (N=151)	Percentage (%)
Gender		
Man	92	60.9
Woman	56	37.1
Prefer not to say	3	2.0
Age		
< 25 years	26	17.2
26-35 years	72	47.7
36-45 years	37	24.5
> 46 years	16	10.6
Education		
High school or below	87	57.6
Bachelor's degree	35	23.2
Master's degree or above	29	19.2
Occupation		
Unemployed	24	15.9
Student	17	11.3
Student worker	4	2.6
Part-time worker	14	9.3
Full-time worker	92	60.9
Geographic Scope		
Europe	104	68.9
North America	28	18.5
Asia	9	6.0
South & Central America	7	4.6
Africa	3	2.0

Source: Authors' own work

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Digital technologies for Knowledge Management Processes: Exploring managers' perspectives in an Italian luxury hotel group[1][2]

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Abstract

Framing of the research: *This paper aims to contribute to hospitality management research by advancing knowledge on exploiting digital technologies (DTs) to enhance internal knowledge management processes (KMPs) in luxury hotels. It provides an in-depth exploration of how and to what extent DTs support KMPs (i.e., acquisition, creation, storage, sharing, and application), assisting the hotel's decision-making and actions.*

Methodology: *The structured-deductive approach was adopted, starting with theory and progressing to an empirical exploration of two luxury hotels in Milan (Italy). A case study was developed, and eleven semi-structured interviews were conducted with top and middle managers. These activities enabled the collection of managers' insights and experiences, including ideas, opinions, and emotions, which were juxtaposed and compared.*

Findings*: Findings deepen understanding of how DTs integrate and enhance KMPs, support critical reflection on the enablers and barriers to DTs' use and exploitation in internal KMPs, and offer fresh insights into the relationships between KMPs-DTs integration and organisational change in luxury hospitality.*

Practical implications: *In luxury hotels, leaders play a key role in guiding a structured digital transformation journey, leveraging reskilling and upskilling in digital competencies and engaging human resources in organisational and managerial change. A culture of innovation is a combined effect of DTs and the involvement of all human resources. This requires fostering a collaborative culture, establishing cross-departmental coordination mechanisms, and implementing targeted training and continuous support to reduce resistance and strengthen staff engagement, thereby embedding DTs into daily operations rather than treating them as stand-alone tools.*

Originality of the paper*: The under-investigated research topic of the internal micro-perspective of top and middle managers interpreting DTs for KMPs has been adopted. The research identifies areas for theory building in hospitality at the intersection between digital transformation, KM, and human resource management.*

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Key words: *knowledge management processes; digital technology; luxury hotel; hotel managers*

1. Introduction

Although advances in the hospitality industry demonstrated the broader application of Digital Technologies (DTs) (McKinsey, 2024), research underestimated their role in knowledge management processes (KMPs) (Gürlek and Koseoglu, 2023). Studies on DTs for KM in tourism and hospitality have prioritised the consumer perspective, focusing on DTs supporting travellers' knowledge acquisition and sharing (e.g., information search and decision-making), as well as customer interaction and experience (Fauzi, 2023). The literature has treated chiefly KM and DTs as separate topics. Scant research has focused on the potential impact of DTs on internal organisational processes (Gürlek and Koseoglu, 2023). There is a general undervaluation of the application of DTs to enhance the broader spectrum of KMPs (Fauzi, 2023).

Implementing effective and efficient KMPs is a critical challenge for organisations (Liebowitz and Beckman, 2020). This is even more true nowadays, where organisations are exploiting DTs in KMPs to address strategic and organisational changes (Presenza *et al.*, 2017), introducing new ways of thinking and working and leveraging them to serve the ever-changing needs of external and internal customers (Castaneda and Cuellar, 2020). From an internal perspective, DTs have revolutionised how employees learn and transfer knowledge, fostering autonomous, informal, open, networked, and continuous processes. Furthermore, by assuming cognitive tasks once handled by humans (e.g., storing, retrieving, and interconnecting information), technology frees up cognitive resources, enabling their allocation to higher-order KM activities (Sigala and Chalkiti, 2015). Thus, literature considered DTs as facilitators of KMPs, such as knowledge acquisition, creation, storage, sharing, and application (Leoni *et al.*, 2022).

While these dynamics have been widely examined across various organisational contexts, their exploration within the hospitality industry remains relatively limited. Given the focus on luxury accommodation, such an inquiry is even rarer, as new technologies are still mainly investigated as a lever for customer satisfaction and loyalty (Ku *et al.*, 2024).

Luxury hospitality is a rapidly expanding and dynamic segment within the broader hospitality industry (Franco *et al.*, 2022a). It represents the third-largest market share in the global luxury goods industry, valued at USD 140.28 billion in 2023 and expected to grow to USD 369.23 billion by 2030 (MOF, 2024). Moreover, luxury hospitality is well-positioned to adopt innovative practices and strategies (Wu *et al.*, 2023; Franco *et al.*, 2022b). It has budgets and room for trial and error, facilitating experimental adjustments and fine-tuning innovative strategies that could catalyse widespread change throughout the hotel sector (Wu *et al.*, 2023). Furthermore, the luxury hotel industry relies on its workforce's strategic assets of knowledge, experience, judgment, intelligence, and relationships to provide top-tier services (Ferrary, 2015).

Therefore, the innovative use of DTs is imperative for luxury hotels (Cain *et al.*, 2024), although their managers hesitate to integrate technology into services (Athwal *et al.*, 2019). They may harbour concerns that integrating technological elements into their products or services could erode the human touch and warm relationships they typically cultivate with customers (Athwal *et al.*, 2019). This potential reticence underscores that technology acceptance, adoption, and use in the hospitality industry constitute an emerging research stream (Guo *et al.*, 2023).

According to the above, the research aim is to examine how DTs support KMPs and managerial decision-making in luxury hotels, and to explore the extent to which they facilitate these activities. Given the complexity of KM and the multifaceted ways DTs may influence and intertwine organisational practices, the study adopts an internal perspective by focusing on top and middle hotel managers involved in KM across different departments. Moved by the need to capture managerial perspectives on technology-driven knowledge processes, the study is guided by the following research question: *How, and to what extent, do DTs facilitate KMPs, according to luxury hotel managers?*

Empirically, this study explores two hotels in Milan, Italy, that are part of an Italian luxury hotel group: Grand Hotel et de Milan and the STRAFhotel&bar. Based on the findings, this study proposes a preliminary interpretative framework of human-technology interaction in KMPs that identifies three typologies of KMPs arising from the interplay between human resources and digital technologies (DTs): i) hybrid human-technology KMPs, encompassing knowledge acquisition and creation; ii) technology-driven KMPs, primarily related to knowledge storage; and iii) human-driven KMPs, focusing on knowledge sharing and application dimensions of KM in practice. It deepens understanding of human-technology interaction in KMPs and fosters critical reflection on the concrete role of DTs in luxury hospitality, based on managers' direct experiences.

The remainder of the paper is organised as follows. Section 2 reviews the literature on DTs for KMPs in the hotel industry, highlighting the research gaps regarding hospitality and luxury hotels. Section 3 outlines the research design and procedure, detailing the empirical focus on top and middle managers in the two selected luxury hotels. Section 4 presents the findings on how and to what extent DTs facilitate KMPs and managerial decision-making. Section 5 discusses an interpretative framework of the human-technology continuum in KMPs of luxury hotels. Section 6 concludes by highlighting contributions, limitations, and avenues for future research.

2. Theoretical background

2.1 Digital technologies in the hotel industry

Digital transformation has emerged as a critical strategic imperative for hospitality firms, enabling them to enhance customer experiences and strengthen their competitive advantage by leveraging DTs (Helal, 2023; Iranmanesh *et al.*, 2022). DTs represent a "combination of information,

communication, computing, and connectivity technologies that fundamentally transform business capabilities" (Bharadwaj *et al.*, 2013, p. 471).

With the rapid advancement and widespread adoption of DTs, the hospitality industry is transitioning into a new era of smart operations (Stylos *et al.*, 2021). DTs are profoundly transforming how hotel operations and value chains are managed (Mingotto *et al.*, 2021) to achieve better financial performance, quality of service, resource utilisation, greater flexibility, and, more generally, nurture competitiveness (Lenuwat and Boon-itt, 2022). Despite their potential to deliver personalised, data-driven services and improve operational efficiency, most hospitality organisations continue to underutilise DTs, adhering to traditional, often inefficient management practices and legacy mindsets (Buhalis *et al.*, 2023). Besides, these technologies yield benefits only when strategically integrated into business models and aligned with organisational goals (Iranmanesh *et al.*, 2022). Thus, digital transformation in hospitality is not solely technological but also strategic and cultural, requiring alignment among technology, human capital, and organisational agility (Ullah *et al.*, 2025; Hadjielias *et al.*, 2022).

2.2 Knowledge management processes in the hotel industry

Knowledge "is related to the company's customers, products and services, operational procedures, competitors and job associates" (Yang and Wan, 2004, p. 595), and it usually arises as the tacit knowledge of employees (Zhang and Jiang, 2015). This depends on the sector's specificity, which is labour-intensive, so employees are at the centre of all processes (Gürlek and Koseoglu, 2023). Employees often accumulate substantial knowledge through on-the-job experience or during implementation, making practical learning a frequent occurrence. As a result, hotel staff's expertise is typically implicit and deeply ingrained (Rao *et al.*, 2021). Thus, hotels must preserve accumulated experiences to prevent their loss when employees quit or rotate between hotels (Bouncken, 2002).

Additionally, there is a requirement to support unskilled workers and newcomers by leveraging the experiences of existing employees, establishing clear, comprehensible standards, and promoting a culture of continuous learning (Bouncken, 2002). This highlights the importance of knowledge storage for the hotel to retain and access valuable insights, facilitating continuous improvement, staff training, and, ultimately, enhanced guest experiences. Following the acquisition of new knowledge, a hotel must assimilate it effectively to facilitate smooth knowledge transfer. Assimilation refers to a hotel's capability to thoroughly absorb, analyse, process, interpret, understand, internalise, and categorise new knowledge to ensure the efficacy of knowledge transfer processes (Situmorang and Japutra, 2024). Furthermore, hotels must cultivate innovative service behaviours among their employees by fostering knowledge-sharing (Hallin and Marnburg, 2008). Knowledge sharing is, in fact, crucial for hotels' competitive advantage, as it enhances the ability to find more effective solutions and to respond rapidly to market trends (Vallat *et al.*,

2017). It involves "the exchange of employee knowledge, experiences, and skills through the whole department or organisation" (Lin, 2007, p. 315), thus occurring when an individual is willing to learn and assist others in developing new capabilities. This process is essential in transforming individual knowledge into organisational knowledge that "consists of prior individual experience, internal existing routines, new operating routines and any kinds of knowledge related to organisational operations" (Yang, 2008, p. 348).

2.3 Integrating DTs and KMPs: the luxury hotel context

Although hospitality research increasingly documents how DTs enable data capture, analytics, and automation, the literature still treats KMPs and DTs in parallel rather than as an integrated capability. Recent reviews (Iranmanesh *et al.*, 2022) portray the field as rich yet fragmented, calling for frameworks that connect technology with organisational learning routines and strategic renewal in hotels. At the same time, the rapid spread of DTs exposes human-capital and cultural bottlenecks, such as limited digital skills, employee resistance, and ethical concerns. This suggests that hotels must align technology with learning climates and agile organisational structures to realise value (Melián-Alzola *et al.*, 2020). Many studies remain cross-sectional or technocentric, emphasising system implementation and operational efficiency while offering limited causal insight into how DTs reshape knowledge creation, sharing, and utilisation across functional and organisational boundaries (Buhalis and Leung, 2018).

While overlooked mainly in hospitality management research, the integration of DTs and KMPs remains unexplored in the luxury hospitality sector, where digitalisation continues to be confined primarily to boosting and measuring guest experiences (Ku *et al.*, 2024), with limited attention to the "backstage" activities and processes that enable these experiences. Luxury hotels are particularly well-positioned to experiment with and invest in integrating DTs-KMPs, as outlined in the Introduction, because they typically anticipate and lead industry trends. Although the intelligent use of DTs is increasingly essential for luxury hotels (Cain *et al.*, 2024; Shin and Jeong, 2022), this segment may face high cultural and organisational barriers. These barriers stem from persistent scepticism and hesitation towards digitalised processes, which may be perceived as potentially undermining the core value of luxury hospitality, namely human relationships (Athwal *et al.*, 2019). For instance, human-centred interactions remain fundamental to knowledge acquisition and sharing, as they are inherent to the special care for the luxury guest. Gaining more profound insights into the integration of DTs-KMPs within organisations is, therefore, critical to understanding concrete barriers, such as managers' reluctance to accept, adopt, and use new technologies in luxury hotels.

There is considerable scope to argue that DTs may be pivotal in strengthening KMPs by enabling luxury hotels to capture, share, and leverage both tacit and explicit knowledge across organisational levels. Grounded in the resource-based view (Barney, 1991) and dynamic capabilities theory (Teece, 2007), DTs may act as strategic resources that

enhance a firm's ability to sense market changes and emerging customer needs, integrate dispersed knowledge, and reconfigure resources for innovation, such as new services and personalised guest experiences, and competitive advantage. It follows that integrating DTs and KMPs can facilitate the collection and processing of large volumes of data (Leoni *et al.*, 2024; 2022). This combination may enable seamless access to knowledge resources across different locations, promoting a culture of knowledge sharing and collaboration within organisations (Castaneda and Cuellar, 2020) and allowing employees to exchange ideas and collaborate in real time, overcoming geographical and temporal barriers (Levy, 2011). Tools such as big data analytics, artificial intelligence, and cloud-based systems may facilitate real-time knowledge creation and dissemination, transforming information into actionable insights and promoting adaptive learning (Iranmanesh *et al.*, 2022). Moreover, digital platforms may encourage organisational learning by connecting employees, guests, and partners within knowledge ecosystems (Buhalis and Leung, 2018).

Accordingly, this study explores the integration of DTs-KMPs to address existing research gaps, theorising their entanglement and unveiling the emerging organisational, technological, and cultural enablers and barriers that condition their integration and influence innovation and performance outcomes in luxury hotel management. In doing so, it contributes a knowledge-centric perspective that advances current debates on how digital transformation in hospitality is as much a strategic, cultural, and organisational process as it is a technological one.

3. Methodology

3.1 Research design

This study employs a qualitative research design to explore an under-researched topic, specifically the role of DTs in luxury hotels' KMPs. A qualitative approach was chosen to gain a deep understanding of hotel managers' perceptions, opinions, and emotions, as shaped by their professional experiences. A multiple-case analysis was conducted to identify patterns and differences in the use of DTs for KMPs from a comparative perspective (Eisenhardt and Graebner, 2007). Because the question focuses on understanding complex managerial perceptions and contextual mechanisms, a qualitative approach enables the collection of rich, nuanced data on participants' experiences and interpretations. The multiple-case analysis further strengthens this design by allowing comparisons across two hotels, thereby identifying both common patterns and context-specific differences in how DTs support KMPs.

The study focuses on two luxury hotels in Milan, Italy: the Grand Hotel et de Milan (affiliated to The Leading Hotels of the World) and the STRAFhotel&bar (affiliated to Members of Design Hotels™ by Marriott), both part of the Manzoni Hotels & Spas, a group committed to delivering unique luxury experiences. Case selection followed a theoretical sampling strategy to maximise the opportunity for theory building (Eisenhardt,

1989). Theoretical sampling is a non-probabilistic approach that aims to identify cases that can contribute to theory development by illuminating key aspects of the phenomenon under scrutiny.

Four criteria guided the selection. First, both hotels have undergone long-term digital innovation trajectories. This makes the cases particularly relevant for observing KMPs in contexts open to digital innovation. Second, while sharing some similarities, they represent distinct models of luxury hospitality. The two hotels are in the centre of Milan, one of Europe's most dynamic luxury destinations and a highly competitive urban context (PWC, 2023). Here, firms are urged to innovate and continually boost value creation. They are both 5-star properties catering to a global clientele, yet with important distinctions. The STRAFFhotel&bar offers a contemporary, design-oriented, and urban luxury concept. At the same time, the Grand Hotel et de Milan is a heritage hotel that delivers a classic luxury experience rooted in history and traditional codes of elegance. Their differences broaden the exploration of the DTs-KMPs nexus in the luxury context by allowing potential theoretical variation.

Third, within the same corporate group, the cases provide an opportunity to investigate interorganisational dynamics in the digitalisation of knowledge flows and managerial processes within shared ownership structures. This is especially relevant in luxury hospitality, where mergers and acquisitions reshape the industry, driving rapid structural transformation and dimensional growth to boost investments (including digital assets) and enhance competitiveness (Zhang *et al.*, 2020).

Finally, the two hotels afforded researchers substantial access to the firm (De Massis and Kotlar, 2014), facilitating multiple interviews with key informants throughout the study and ensuring informational richness.

3.2 Data collection

We collected data between April 2024 and January 2026, including documentary information, archival records, and interviews. Online newspapers, magazine articles, and YouTube videos were collected and examined, along with websites and documentary materials provided by the hotels, with internal reports offering valuable insight into the strategies driving their operations. These secondary sources helped us trace the hotel contexts in which managers' experiences have unfolded.

We conducted eleven interviews with managers from the two hotels, including top managers (CEO/COO and General Manager) and department managers (human resources, revenue, food and beverage, and operations). The semi-structured interviews with key informants enabled us to explore topics in depth, connect analytical categories with respondents' experiences (Gephart, 2004), and provide insights into top and middle managers' firsthand understanding of DTs' use in KMPs. All managers at the two hotels participated in the interviews (Table 1). Interviewees were informed about the study's aim and the topics covered by the interview questions before the interview date. Before starting the interview, they were reminded of the research aim. Consent to the interview and permission to record the interviews through MS Teams were requested and granted.

The interview protocol does not elicit or collect sensitive or confidential information about the interviewees.

The Chief Financial Officer (CFO)/Chief Operating Officer (COO), who coordinates overall innovation and change management processes, was interviewed four times. The first interview was conducted to address the critical aspect of the research, the overview of the two hotels' path of progress and innovation; the second one was aimed at collecting his individual first-hand experience of the DTs-KMPs integration, and the third and fourth provided final clarifications on the topics that emerged during earlier interviews.

Tab. 1: Interviews' details

#	Managerial position in the hotel	Hotel	Duration
1	Human Resources Manager	Grand Hotel et de Milan & STRAFhotel&bar	68 Minutes
2	General Manager	Grand Hotel et de Milan	72 minutes
3	Revenue Manager	Grand Hotel et de Milan & STRAFhotel&bar	64 Minutes
4	Operations Manager	Grand Hotel et de Milan	70 Minutes
5	General Manager	STRAFhotel&bar	112 Minutes
6	Chief Financial Officer - CFO Chief Operating Officer - COO	Grand Hotel et de Milan & STRAFhotel&bar	115 minutes (1st interview) 72 minutes (2nd interview) 95 minutes (3rd interview) 35 minutes (4th interview)
7	Food & Beverage Manager	STRAFhotel&bar	111 Minutes
8	Operations Manager	STRAFhotel&bar	85 Minutes

Source: our elaboration

An interview protocol with open-ended questions was employed to gain in-depth insights into respondents' perceptions, attitudes, and opinions. The semi-structured interviews began with a general introduction to the study's objectives, encouraging participants to introduce the most relevant aspects for them. This was followed by a more structured protocol that directed the interviewees' attention to KMPs and DTs while allowing them to explore topics in the immediate context and potentially reveal unexpected insights.

The interview protocol was organised into four sections. First, interviewees were asked about the hotel's digital technology endowment and adoption, exploring the timing, purpose, perceived results, and implementation challenges. This introductory set of questions facilitated the conversation by focusing on digital tools in a narrow, descriptive way. Second, the focus shifted to knowledge management and the integration of technology into related processes. Interviewees were guided to identify specific processes (e.g., acquisition, sharing, storage) to help them frame and visualise the entire knowledge management process from their practical experience. Third, interviewees reflected on the results, challenges, and pitfalls in adopting digital technologies for knowledge

management, including their views on hotel employees' involvement, impact on competencies, job quality, and satisfaction. Finally, the impact of the DTs-KMPs integration on the organisation and its evolution over time was explored. At the end of each interview, a table listing KMPs and the technologies mentioned was presented to validate and refine the discussion of the collected data. Informants were also given ample freedom to raise related issues, fostering open dialogue. Before launching the complete study, a pilot interview was conducted with one informant to refine the protocol and ensure the questions were clear and comprehensible (Hadjielias *et al.*, 2022).

Lastly, between December 2025 and January 2026, the Chief Financial Officer (CFO)/Chief Operating Officer (COO) and the HR Director were contacted via email to provide additional information and documents on previously collected and analysed materials. These further interactions allowed us to further refine the conclusions reached through the study, also giving us access to information and data extracted from the following documents, thus increasing the number of secondary data at our disposal: corporate presentations; internal strategic documentation on digitalization and the adoption of the SYSDAT BI system; agreement and related documentation and linked Climate Survey 2024 results; multi-year training plan 2019-2024; implementation agreements with CAPAC for the New Skills Fund; Fondir/ManagerItalia documentation for management training; analysis of internal training needs; qualitative conclusions reported in the training planning documents; strategic materials relating to brand positioning and international affiliations; and budget reports per year.

3.3 Data analysis

The structured-deductive approach was adopted, starting with theory and moving toward empirical validation. As Yin (2018) suggests, this approach ensures that case study research is systematic and theory-driven, allowing for rigorous validation or refinement of theoretical constructs.

The interview transcripts were first coded according to the different KMPs (i.e., "Knowledge Acquisition", "Knowledge Creation", "Knowledge Storing", "Knowledge Sharing", and "Knowledge Application"). Another coding round identified DTs at stake within each KMP (examples of codes are "Property Management System", "Business Intelligence" system, and "Forecasting" tools). The coding process remained open to potentially emerging themes not discussed in the literature, which could cast further light on the intersections between KMPs and DTs. Researchers wrote notes on emerging topics during the analysis and, finally, converged on distinct text patterns concerning the "enablers" and "barriers" of DTs-KMPs integration. The researchers enacted a third coding round to detect the text to be further coded. The coding process involved all the researchers who shared the first- and second-round coding results. When disagreeing, the researchers deepened the analysis to converge on a shared vision of the sentences' meaning and categorisation. Annex 1 reports sample quotes organised following the adopted KM theoretical frameworks.

The multiple data collection methods outlined in Section 3.2 enabled triangulation, thereby reinforcing these research results. Triangulation enabled the researchers to integrate primary data (interviews) with secondary data (including documents and archival sources), enriching the interpretation of the findings and enhancing the study's internal validity (Eisenhardt, 1989; Myers, 2019). This qualitative methodological approach provided insights into managers' experiences within their real-life organisational context, offering a "stronger substantiation of constructs and hypotheses" (Eisenhardt, 1989, p. 537).

4. Findings

4.1 Digital innovation, organisational and managerial change and human resources training

Findings reveal that the hotel management has envisioned digital innovation not only as the introduction of new ICT tools but as a lever for organisational and managerial change involving human resources. As explained by the CFO, "During the period 2019-2025, the company embarked on a structured digital transformation journey, with a clear focus on staff reskilling and upskilling to respond to an increasingly competitive and data-driven high-end luxury hotel market. [..] The adoption of Business Intelligence (BI) systems aims to support strategic decision-making through data analysis. [..] This process has been strengthened by the formal establishment of a business network '*Milan Hoteliers*', aimed at sharing know-how, processes and innovation between the two companies." (Interviewee #6).

Reskilling and upskilling of human resources (120 hours in total, aimed at 16 participants, including managers and department heads) support a data-driven managerial approach, improving decision-making quality, operational efficiency, and overall marginality. The investment has been € 30.000 (2019), € 45.000 (2022), € 55.000 (2023), € 40.000 (2024). It allowed for: developing advanced data-driven analytical skills; strengthening internal technical autonomy; supporting organisational change by developing managerial soft skills; and increasing employability and aligning staff skills with new production models. It has involved mainly Front Office and Revenue Management, with a focus on pricing, disintermediation, and revenue optimisation; Food & Beverage for controlling costs, marginality, and operating flows; Budget & Forecast, using historical data and forecast KPIs; Warehouse, for flow automation and inventory control.

In the following sections, managers' first-hand experiences are framed, highlighting the entanglement of DTs and KMPs and the emerging enablers and barriers influencing their relationships within the context of the two hotels. In Annex 1, all the quotes useful for the analyses are listed.

4.2 Knowledge acquisition

Interviewees highlight the importance of acquiring knowledge from both external and internal environments. Concerning the external environment, Interviewee #3 emphasises that "the knowledge of everything surrounding the hotel is crucial". In this vein, the investigated hotels acquired knowledge in two main ways: i) by hiring new people and ii) through technological tools. In the first case, the recruitment process is crucial in knowledge acquisition. In fact, in recent years, hotels - especially after COVID-19 - have experienced turnover that affected almost 100% of employees. This has led to hiring personnel qualified in the hotel sector and subjects from entirely different contexts, such as the automotive sector (e.g., Interview #1). In particular, the hotels focus their recruitment process on professionals with significant previous experience to encourage acquiring new knowledge that could stimulate adopting a culture that embraces digital transformation (#2). In this regard, it is worth mentioning the statement of Interviewee #5: "I have a long experience in international chains that I immediately started to apply to the STRAFhotel&bar from the first day I arrived […] bringing into the organisation previous professional experiences gives a wealth of insights otherwise hardly acquired".

In the second case, technology is crucial to improving knowledge acquisition processes for analysing booking data, occupancy trends, customer types, market, customer feedback, and competitor benchmarks (Interview #4). For example, hotels rely on a digital tool that aggregates and analyses all customer reviews, enabling almost perfect alignment between customer expectations and the hotel's offering (#7 and #8). At the same time, these knowledge acquisition processes through technology are only partially established, and hotels are constantly working to improve them (#8).

Regarding the internal environment, the reciprocal relationship between humans and technology for effective, efficient knowledge acquisition is more evident. We can distinguish between the knowledge acquired i) during routine activities within the hotel, ii) through ad hoc training activities, and iii) through memberships and collaborations. In the first case, for example, if a housekeeper realises that a bottle of water is missing from the room minibar, she inserts this information into the tablet at her disposal (#8). Through digital tools, individual knowledge acquisition (i.e., the housekeeper knows that a bottle of water is missing) becomes collective. Interviewee #7 points out that "all the actions taken by employees enrich the hotel's database", emphasising how operational activities contribute to the more extensive knowledge pool. In the second case, it is worth noting that employees acquire knowledge through ad hoc training courses and development programs offered at both the operational and strategic levels (#1 and #5). Employees' training and engagement are crucial because they equip them with knowledge and confidence, especially concerning the exploitation of technologies (#2, #3, #5, and #6). Lastly, regarding memberships and collaborations, the investigated hotels are members of Design Hotels™ by Marriott, a global collection of independent boutique hotels known for their distinctive design, creativity, and focus

on providing unique and memorable guest experiences. Being part of this network also gives several opportunities, facilitating access to fresh knowledge" (#5). Moreover, they collaborate with technology vendors and consultants, enabling them to acquire and develop skills and competencies by leveraging their expertise, tools, and established processes.

4.3 Knowledge creation

The interviewees stressed that knowledge creation is a collaborative and iterative process that combines managers' and employees' knowledge with knowledge acquired through DTs. Interviewee #7 describes this integration process between humans and technology as a "four-handed job", crucial for refining strategies and addressing real-time challenges. Creating new knowledge is a continuous process of generating and sharing new ideas through social and digital interactions. Therefore, knowledge creation implies the opportunity for contamination across different types of knowledge, tacit-human and explicit-digital knowledge.

Knowledge creation primarily occurs through meetings, during which employees (mainly department managers, together with the group owners) comment on the analytical insights generated by DTs (#5), enriching them with their knowledge and experience to identify strategic and operational actions to improve the organisation (#8). In this respect, Interviewee #2 states, "During these meetings, we get through all bookings, and we work together to generate a forecast for our bedrooms and understand if we are sticking to our goals or not". In other words, according to Interviewee #7, when a manager has an idea (i.e., creates new knowledge), in most cases, it is the result of the integration between the individual's intuition (based on their previous tacit knowledge), supported by data and information produced by DTs (explicit knowledge). Thus, the organisational capability to create knowledge results from the continuous interplay between the novel outputs generated by technology and the unique knowledge possessed by humans.

4.4 Knowledge storing

Storing knowledge effectively enables the proper capture and retention of organisational knowledge, helping the organisation develop better strategies for the future (#8). This is fundamental for sectors - such as the hotel industry - characterised by high turnover, as it enables new employees to access consolidated knowledge - i.e., the organisation's historical memory - to avoid repeating errors and/or duplicating efforts. Interviewee #7 emphasises the significance of maintaining a historical record of actions, successes, and failures to facilitate onboarding and support future managers: "It is essential to ensure that everything I have tried, what worked, and what didn't, can be recorded and stored for whoever comes after". In this case, technology, with its potentially infinite storage capacity, is the fulcrum to leverage, ensuring that valuable information is not lost and is accessible to those who need it. Furthermore, knowledge-storing systems are made through ad hoc DTs, which saves time when retrieving the required information at a given moment (#7).

Moreover, the knowledge-storing system is essential as an archive of information for those who work (or have worked) in the company itself (#1), allowing the hotel to improve its processes and performances not only towards the outside (i.e., customers) but also towards the inside (i.e., employees).

4.5 Knowledge sharing

Unlike knowledge storage, the knowledge-sharing process is mainly based on the human factor, as underlined by Interviewee #8: "Notwithstanding the support of technology, human relations prevail". Knowledge sharing primarily occurs during the frequent general and thematic meetings between managers. A daily verbal exchange occurs for managers who share the same offices or work on the same matter from different perspectives (#8). However, among middle and top managers, knowledge sharing is mediated by the Property Management System (PMS) and the Business Intelligence (BI) system, enabling data and report sharing for forecasting and strategic decision-making (#2, #3, #7, and #8). At a lower level, DTs do not support knowledge sharing among the team managers and the other employees (#5). Face-to-face meetings are fundamental in this case to share information, decisions, and objectives, as emphasised by Interviewee #7, who stated "to clarify and make people remember key concepts and not to disperse information we have morning meetings, physically at the hotel most of the time" and Interviewee #8, who clarified that "We prefer this modality because […] if someone does not understand some aspect […] we can address the problem and fix it more easily and quickly".

At the same time, it is worth mentioning that digital solutions are adopted for capillary and instantaneous knowledge sharing (#8). In this regard, Interviewee #6 stresses that "the business intelligence platform […] has been implemented in all hotel departments, allowing information flow transfer and sharing". At the same time, it is worth mentioning that - increasingly - knowledge in the forms of pictures, documents, and multimedia materials is shared to transfer knowledge continuously and in the induction phase: "If in the past the employees had to search paper manuals, today they can open the PDF files shared over time on WhatsApp" (#7).

Furthermore, the hotel industry is characterised by a high turnover, which has affected hotels, especially since COVID-19 (#1). Hence, the need to transfer knowledge rapidly and effectively to new employees has grown significantly. In this vein, technology plays a vital role: training has become much more digital, with technical courses taken online and integrated with offline ones for practical aspects and soft skills (#1). Moreover, the collaborations established with foreign companies allow employees to exchange with professionals working in different contexts, enriching their backgrounds (#1). The same applies to the induction phase, which relies more on DTs (e.g., the PMS) for transferring knowledge (#4). This is even more true in certain divisions like the F&B one, where "when a new employee arrives, I share [with him/her] few interpretative clues - like this

is our identity, this is the key problem, this is our strength - [and], with these macro-categories, he/she has the filters to check our digital sources, databases, and interpret them most effectively" (#7). Besides, DTs enable the transfer of learned experiences by previous managers and employees (when properly stored), capitalising on trial-and-error processes: "DTs […] facilitate the work of those arriving after you […] If I were entering the company for the first time today, the first tool managers showed me would probably be the business intelligence system" (#7).

Lastly, it is essential to highlight inter-organisational knowledge-sharing processes, i.e., knowledge sharing between the two hotels. This inter-organisational process takes place in two main ways: i) an integrated digital platform and ii) workforce exchange in case of need (#2, #4, #5, and #8). As Interviewee #5 highlights, "We aim for an integration […] to unify various processes and suppliers, so that working at Staff or GH is the same, even though the target markets are different". From an operations perspective, integrated digital platforms are deemed central, so DTs are currently being adopted to meet the needs and characteristics of the whole group. For instance, "the front office agent at GH has different competencies from the front office agent at STRAFhotel&bar. However, if they use the same tool, they become potentially interchangeable" (#5). Moreover, the fact that the two hotels have worked overtime to unify their methodologies and operating procedures ensures they can take advantage of each other's resources, especially in the event of need (#2).

4.6 Knowledge application

All available knowledge across the two hotels is used to make decisions and perform tasks at both the strategic and operational levels. Even in this knowledge application process, human and technological factors coexist and intersect.

DTs have reshaped the organisational procedures and decision-making processes of top and middle managers of all hotel departments, supporting strategic and operational activities. Concerning the strategic level, DTs support hotel managers in planning, decision-making, and monitoring activities while enhancing problem-solving speed, as pointed out by many interviewees: "Revenue Management software is fundamental for my job; it allows revenue optimisation and dynamic rate management by predictive analysis, distribution channels optimisation, and monitoring" (#3). As emerged, DTs "generate perspective data for forecasting, allowing to evaluate the level of costs and revenues and make decisions; it allows to redefine strategy, marketing approach, and hotel rates" (#2); "Budget and forecast are made by the BI" (#6).

At the same time, technologies support standardised hotel procedures and improve the systematic use of individual and organisational knowledge, enhancing efficiency, effectiveness, proactivity, and the provision of innovative services, thereby optimising time and improving customer satisfaction. In this vein, Interviewee #6 points out that "[through DTs], information is accessible and usable by all departments with high details"; while Interviewee #8 emphasises that "[technologies] allow the definition

of guest preferences' trends and allows access to this information as soon as we need to use it […], enhancing customer satisfaction". Practically speaking, DTs - like Hoxell - provide precise data on room status, housekeeping activities, minibar consumption, and the like, which are vital for housekeepers' daily operations and long-term planning (#8). By doing so, "these tools allow a 360° reflection on specific activities to understand if there is a need to change something, to reduce costs, etc".

4.7 Enablers and barriers

According to interviews, many factors facilitate or hinder luxury hotels' adoption of technologies in KMPs. These factors can be categorised as i) technological, ii) environmental, and iii) organisational factors.

Concerning the technological factor, a robust IT infrastructure is essential, keeping the foundation for seamless integration and operation of advanced DTs. Investment in high-speed Internet, secure cloud services, and reliable hardware ensures that the digital ecosystem functions efficiently (#3, #5, #7, and #8). At the same time, adopting user-friendly technological tools facilitates hotel staff's acceptance and usability (#3).

Intrinsic characteristics of DTs may inhibit their adoption, such as: i) implementation complexity, especially when dealing with legacy systems that are difficult to integrate with new DTs, leading to interoperability problems and potential disruptions (#3 and #5); ii) costs, including high initial costs and ongoing expenses for technology maintenance and upgrades (#5); iii) data security and privacy concerns (e.g., implementing new systems carries on the risk of data breaches and the challenge of ensuring compliance with data protection regulations, #5); and, iv) time constraints, both in terms of the time required for technologies implementation and ongoing management (#5). Moreover, it is essential to consider the technological integration issues between the two hotels. The hotels are part of the same group. Thus, there is a need to align systems and processes to ensure seamless operations and consistency across the properties (#3, #4, and #5).

Among the enabling factors in the external environment, competitive pressure and government support play a role. Interviewee #5 said the first aspect: "Observing competitors plays a crucial role in implementing new solutions as it provides valuable benchmarks and insights into industry trends and best practices. Analysing how competitors leverage DTs and KM systems pushes us to go in the same direction and try to improve". Regarding the second aspect, Interviewee #5 stressed how the possibility of taking advantage of public funds allocated by the government is of vital importance to ensure that the organisation can effectively adapt to the digital transition by adequately training its employees without having to bear the cost or at least at a reduced price (#6).

Regarding the barriers, it is possible to incorporate the client's needs and the characteristics of the luxury hotel sector. According to the interviewees, the hotel employees' knowledge and ability to apply it creatively are crucial to satisfying guests' expectations for their luxury experience. The irreplaceable qualities of employees define exceptional experiences,

creating memorable stays and fostering guest loyalty. As emphasised by all the interviewees, while a mobile app might allow for self-check-in and provide important information, the warm welcome from staff members or their ability to address concerns even before they are formally verbalised makes the arrival experience unique and makes guests feel special.

Regarding organisational factors, managers' commitment and leadership drive the strategic vision, create a supportive environment, foster a culture that values and utilises KM, and facilitate and accelerate technology adoption (#5 and #6). These enablers can counterbalance the organisational barriers, mainly represented by unskilled human resources and cultural resistance to change. Addressing these barriers requires thoughtful change management strategies, targeted training programs, and fostering a culture of inclusivity and continuous learning, as employees may be averse to change (i.e., reluctant to adopt technologies) due to fear of the unknown, job security concerns, or comfort with existing systems (#1, #2, #3, #4, #5, and #7). Moreover, new digital solutions may be misaligned with the overall strategy or hindered by siloed departments, leading to fragmented efforts and limited positive impacts (#6). Finally, the lack of clear performance indicators that measure the (positive) implications of adopting technologies in KMPs makes it hard to justify costs and necessary efforts, slowing down or even stopping DT adoption and implementation (#5).

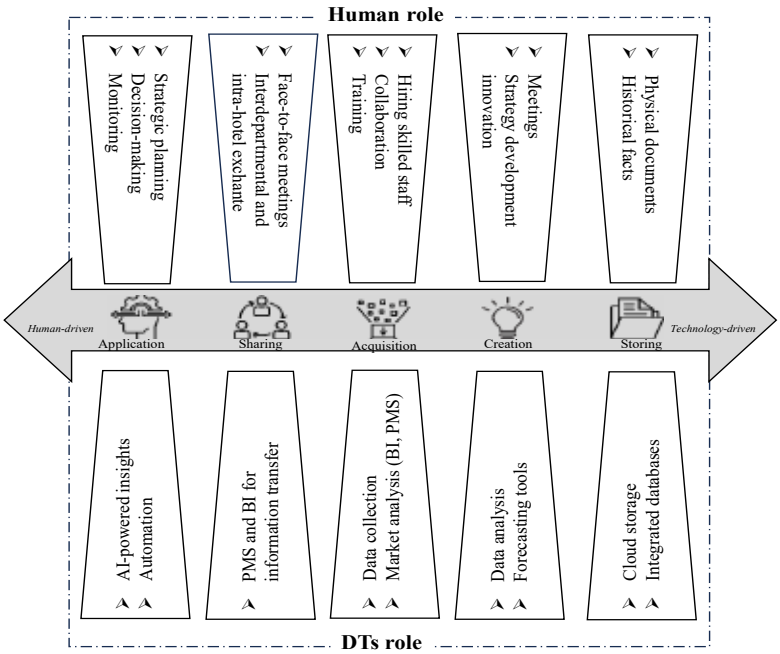
5. Discussion

This study provides insights into hotel managers' perspectives on DTs in KMPs, highlighting the transversal role of DTs in supporting organisational processes, strategic decision-making, and operations (e.g., interpreting data, coordinating, communicating, addressing strategic changes, managing operations, etc.). It underlines the key role of a strategic orientation, combined with a structured digital transformation journey, in driving organisational and managerial change in luxury hospitality.

The case study methodology provided an opportunity to develop an interpretative framework of human-technology interaction in KMPs of luxury hotels, based on the interplay between human resources and DTs (Fig. 1).

As an emerging theoretical contribution of the research, it identifies three typologies of KMPs, as an emerging theoretical contribution of the research, based on the interplay between human resources and DTs: i) hybrid human-technology KMPs, where DTs complement the human role, encompassing knowledge acquisition and creation; ii) technology-driven KMPs, where the DTs' role prevails, primarily related to knowledge storage; and iii) human-driven KMPs, where DTs are marginal, focusing on knowledge sharing and application.

Fig. 1: Human-technology interaction in KMPs of Luxury Hotels



Source: our elaboration

According to the findings, we can assume that knowledge acquisition and creation in luxury hotels are contingent on the effective integration of human expertise and DTs. Knowledge acquisition emerges as a process that complements human resource functions - such as recruitment, training, and inter-organisational collaboration - with the capabilities of DTs, like data collection from integrated databases and business intelligence platforms. Similarly, knowledge creation depends on individual tacit and explicit knowledge derived from DTs.

Moreover, the study underscores that knowledge application, although primarily human-driven, can be significantly enhanced by integrated DTs to optimise operational efficiency, facilitate problem-solving, and support strategic decision-making, such as in event planning within Food & Beverage operations. Knowledge storage, instead, is the only KMP in which DTs play a predominant role, leveraging integrated databases, business intelligence platforms, and other digital tools to retain and organise information systematically. On the contrary, knowledge sharing relies mainly on human-to-human interaction through face-to-face meetings, formal and informal communication, and inter-organisational exchanges. While DTs support technical training and operational knowledge transfer (e.g., revenue management and housekeeping), their role in knowledge sharing remains auxiliary. Inter-organisational knowledge sharing is particularly strategic, contributing to the standardisation of hotels' procedures and fostering a systemic approach to leveraging individual and organisational knowledge. This enhances workforce interchangeability and

organisational adaptability in response to evolving internal and external environments (Lenuwat and Boon-itt, 2022).

This investigation offers critical insights into the acceptance, adoption, and utilisation of DTs within luxury hotels (Guo *et al.*, 2023). The tourism and hospitality industry has increasingly invested in digitalisation. As this study confirms, managers are aware of DTs' contributions to improving operational efficiency and enhancing the quality, speed, and flexibility of hotel processes, thereby reducing costs and increasing effectiveness, as highlighted by Mingotto *et al.* (2021).

However, digital investments primarily focus on customer relationship management, while limited attention is paid to the adoption and exploitation of DTs for internal KMPs in luxury hotels. Besides, the findings suggest that DTs in KMPs remain overlooked in the digitalisation discourse at the investigated hotels, with a firm reliance on well-established technologies, such as BI and PMS. Despite hotel managers acknowledging the potential of cutting-edge DTs, their adoption remains limited. For instance, the Grand Hotel et de Milan is still in the early stages of implementation. Non-Fungible Tokens (NFTs) have been suspended due to their complexity, and AI tools are under early-stage evaluation. Cutting-edge DTs remain marginal for internal KMPs, and time and investment (including human resources) are needed to enable them to play an effective role (Paniccia *et al.*, 2024).

In such a context, there is the need to consider also the existence of several barriers that hinder the widespread acceptance and integration of disruptive DTs, including technological challenges (e.g., high costs, integration difficulties, and data security concerns), organisational constraints (e.g., resistance to change, insufficient digital competencies among staff, and the lack of precise KPIs to assess digital transformation impact), and competitive pressures (e.g., slow adoption rates among industry peers and persistent customer preference for personalised, human-centric luxury service experiences). For example, by actively addressing employees' reluctance and cultivating a culture of digital literacy and adaptability, luxury hotels can enhance KMPs while optimising the benefits of digital transformation (Bouncken, 2002). This also requires managers to ensure that digital initiatives are aligned with organisational structures, decision-making routines, and existing work practices, so that DTs become embedded into daily operations rather than isolated tools. Moreover, providing targeted training and fostering cross-departmental collaboration further strengthens employees' engagement and facilitates the effective integration of DTs into KMPs.

Consistent with prior research (Goran *et al.*, 2017), this study confirms that leadership is a critical enabler of digital transformation, driving strategic and organisational shifts. Hotel managers exhibit a nuanced understanding of DTs' opportunities and limitations, recognising the need to foster human resource engagement and motivation in digital transformations. The findings highlight the significance of leadership in bridging the gap between technological advancements and human capital, thereby facilitating the integration of digitalisation into organisational culture. In this vein, our results perfectly align with the digital transformational leadership concept

(Ullah *et al.*, 2025), understood as managers'/leaders' capability to articulate a compelling digital vision, mobilise employees around digital initiatives, and orchestrate the integration of DTs into operations, routines, and structures. This type of leadership is particularly critical in luxury hotels, where human-centric service logics must be reconciled with data-driven ones to translate technological investments into meaningful improvements in KMPs and to drive strategic and organisational changes.

6. Conclusions

This exploratory research sheds new light on the role of DTs in all the different KMPs in luxury hotels. It explores an underexplored area of hospitality studies (Gürlek and Koseoglu, 2023) by integrating two under-investigated streams of research in luxury hospitality, namely knowledge management and digital transformation. It adopts the internal micro-perspective of top and middle managers that previous studies have neglected, which prioritised the consumer perspective on digitalisation (e.g., DTs enhancing customer experiences) (Fauzi, 2023).

It identifies relevant areas for theory building in luxury hospitality at the intersection between digital transformation and KM, which future research should further develop and empirically investigate. Besides, it offers several managerial implications.

6.1 Theoretical contributions

The novelty of this research lies in proposing a preliminary interpretative framework that unveils the nuances of human-technology interaction across the different KMPs (acquisition, creation, storage, sharing, and application) of luxury hotels. It represents a first theoretical contribution to the academic debate on the role of DTs in KMPs, underscoring the urgent need to combine human touch with DTs.

Although the research confirms that luxury hospitality remains human-centred, it offers three different configurations of human-technology interaction in KMPs (human combined with technology, technology-driven, and human-driven). It allows overcoming the generalised view of human touch as the only way to organise and manage luxury hotels (Athwal *et al.*, 2019; Guo *et al.*, 2023).

The transformative power of digital technologies, well established and rooted in the organisation, effectively supports human resources and HRM, management decisions, and operations, with the potential to improve performance and drive service innovation.

The study opens new avenues for research into how and in which processes human expertise, skills, intuitions, and relational intelligence can capitalise on digital transformation to support specific operations, strategic decision-making, and organisational change. Besides, it expands knowledge of the role of DTs, adding to the prevailing scholarly focus on knowledge sharing as a driver of success, growth, and innovation (McLeod *et al.*, 2024).

As an additional contribution, the study suggests that transformational leadership (Ullah *et al.*, 2025), organisational culture, and values play a significant role in technology innovation and in driving the acceptance, use, and adoption of DTs in hotel operations, decision-making, and organisational changes. They reduce barriers to the acceptance, adoption, and integration of digital technologies into luxury hospitality services and procedures (Athwal *et al.*, 2019; Guo *et al.*, 2023).

This study suggests that scholars can adopt a specific lens to investigate the DTs' role in each luxury hotel, considering peculiarities of service (e.g., role of human touch complemented with DTs), barriers (e.g., slow pace of DTs adoption and use), and enablers (e.g., leadership, organisational culture, and values).

6.2 Managerial Implication

This research identifies implications and challenges for luxury hotel management and innovation. As the main managerial implication for the luxury hotel industry, this study suggests examining the adoption of DTs from an internal perspective, with particular attention to the leadership (CFO and middle managers) role in addressing organisational and managerial change. Leaders in the luxury hospitality industry must guide, day by day, a structured digital transformation journey, leveraging reskilling and upskilling processes in digital competencies, and engaging human resources in organisational and managerial change.

Managing human-technology interaction and giving hotel human resources a central role are the main challenges for managers. It informs hospitality managers about the importance of considering human resources management and organisational aspects (e.g., leadership and culture) when investing in DTs to facilitate acceptance, adoption, and use. Besides, training and sharing processes can support digital transformation, helping hotels overcome cultural resistance and promote the acceptance, adoption, and use of DTs across operations (e.g., through specific KPIs and dashboards).

A culture of innovation in luxury hospitality requires a combined effect between DTs and the involvement of all human resources (top and middle managers, and employees). Investing in the reskilling and upskilling of human resources at different hierarchical levels not only improves operations and routines but also supports organisational and managerial change by developing managerial soft skills.

Inclusive participation in digital transformation and KMPs requires continuous learning, employee engagement, sustaining their motivation and commitment, and an open work environment where innovations are welcomed and collaboratively integrated. In other words, hospitality managers must recognise the importance of aligning digital investments with human resource management and key organisational aspects, such as leadership style, culture, and cross-departmental coordination. Managers should foster a culture of collaboration and innovation, design targeted training programs, and actively involve employees in digital initiatives. These practices can reduce resistance, enhance staff engagement, and

ensure that DTs are not only adopted but also effectively embedded into routines, thus maximising their contribution to KMPs and overall service quality.

Furthermore, KM supported by DTs can help capture best practices and tacit knowledge, allowing new or less experienced staff to deliver the level of service expected in luxury hotels. It will enable managers to identify new service trends and design innovative experiences that differentiate the hotel in the luxury market.

6.3 Limitations and future research

As a qualitative research study, this investigation presents several limitations that future research will likely address.

One limitation of this study is the relatively short data collection period, which may not sufficiently capture the dynamics of organisational change and the evolution of DTs-KMPs integration; consequently, the findings should be interpreted as a time-bounded snapshot that may affect the scope and applicability of the results. Future research could address these limitations by expanding the sample and incorporating perspectives from different organisational levels, and by adopting a longitudinal or follow-up design to provide a more comprehensive and deeper understanding of the processes examined.

Future research could also compare independent and affiliated hotels working in different countries. Additional quantitative research is required to examine relationships between DTs, KMPs, organisational structure (e.g., one-to-one work dynamics, cross-departmental and inter-organisational dynamics), and organisational culture (e.g., work environment, leadership style, innovation and adaptability values). Last but not least, the impact of DTs on employees' well-being can represent an additional area of research.

Given the interpretive and case-based design, the proposed framework and KMP configurations should be regarded as exploratory insights rather than definitive classifications; therefore, future research should test, refine, and validate the KMP typologies that emerged from this study through comparative multi-case studies and larger-scale quantitative investigations across different territorial and organisational contexts, and by incorporating longitudinal designs to examine their stability and evolution over time.

The study intentionally limits the analysis to organisational-level mechanisms; broader contextual influences are a promising avenue for future research. A further limitation of this study is that leadership was not examined as a primary analytical dimension. Although leadership dynamics may shape how digital initiatives are legitimised, resourced, and embedded into daily routines, we intentionally did not develop a detailed leadership-focused analysis to keep the paper's scope tightly centred on DTs-KMPs integration and avoid extending it into broader change-management debates. Future research could explicitly investigate how different leadership approaches (e.g., digital leadership, transformational/participative styles, and governance mechanisms) enable or hinder the integration of DTs into KMPs in luxury hotels, ideally through multi-level designs that include executives, middle managers, and frontline staff, and

through longitudinal or follow-up studies that capture how leadership actions influence adoption, resistance, and routinization over time.

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Annex 1. Sample quotes from interviews

Theme	Quotes
Knowledge acquisition	"Recognizing the importance of attracting top talent in the hospitality industry, we have adopted a fully online recruitment system that streamlines every stage of the hiring process" [Interviewee #1]
	"We embraced online training procedures. This shift not only enhances accessibility but also ensures that our employees are equipped with the knowledge and skills necessary to thrive in the dynamic hospitality industry" [Interviewee #1].
	"Our property management system - Light House - is designed specifically for the hospitality industry, aimed at streamlining and optimizing hotel operations. It provides a comprehensive solution that integrates various aspects of hotel management. In particular, it offers robust reporting tools that provide insights into occupancy rates, revenue performance, and guest demographics" [Interviewee #2].
	"As a revenue management activity (essentially in identifying the best pricing strategies), knowledge of everything that surrounds the hotel is important, therefore, from knowledge of the competitors that are around us and that more or less resemble us to knowledge of the market we are in. Fundamental is knowledge of what is happening in the city and therefore the pressure on the city at certain times" [Interviewee #3].
	"I utilize ReviewPro, a software designed for the hospitality industry, specifically focusing on guest feedback management and reputation management. It helps us to monitor, analyse, and improve our online reputation and guest satisfaction" [Interviewee #4].
	"Our property management system allows to analyse huge amount of data such as Booking Data, Occupancy Trend Analysis, Customer Feedback, etc." [Interviewee #4].
	"We use QR codes for anonymous employee surveys, such as a company climate survey. It plays a significant role in enhancing the feedback process and acquiring valuable knowledge" [Interviewee #5].
	"Webinars are a powerful tool for acquiring new knowledge. By providing access to expert insights, fostering interactivity, and facilitating ongoing learning, webinars enhance educational opportunities for our hotel" [Interviewee #5].
	"Recently, we conducted extensive training for around fifty employees, leveraging a funding opportunity, such as Italy's New Skills Fund. This initiative not only provided financial support but also significantly contributed to knowledge acquisition within the organization. By investing in employee development, we have empowered our team with new skills and up-to-date industry knowledge. This training enhances individual capabilities while fostering a collective knowledge base that strengthens overall operational efficiency. As employees acquire new expertise, the hotel benefits from their ability to apply fresh insights, ultimately improving service quality and innovation across departments [Interviewee #6].
	"I manage the restaurant hall. My goal is to transform raw data into actionable insights that improve service and customer satisfaction. By collecting data on customer preferences, dining habits, order frequency, and feedback, the restaurant castaacquire valuable knowledge about guest behaviours and trends. This ongoing process of data-driven knowledge acquisition helps in refining menus, optimizing seating arrangements, tailoring promotions, and enhancing overall guest experience. Continuous data collection allows the restaurant to stay attuned to changing customer preferences, enabling staff to make informed decisions, personalize interactions, and improve operational efficiency" [Interviewee #7].
	"We use Hoxell, a Hospitality Operations Platform that manages housekeeping data collection. It facilitates knowledge acquisition by providing real-time insights into the status of rooms, enabling staff to make informed decisions and enhance operational efficiency based on the latest information" [Interviewee #8].

Knowledge creation	"We believe it is crucial to hire staff with significant international experience, as well as individuals from sectors different to tourism" [Interviewee #1].
	"My goal is to generate forecast reports approximately every 15 days that take into account historical data and current trends in order to optimize revenues and improve the operational efficiency of the hotel" [Interviewee #3].
	"Human knowledge of context plays a vital role in transforming information into meaningful data knowledge. I believe that contextual understanding enables individuals to interpret data accurately, identifying patterns, trends, and relationships that may otherwise be overlooked. By integrating human understanding with data, organizations can create a rich knowledge base that supports smarter decision-making and more personalized experiences. This context-aware interpretation turns simple data points-like booking history, service requests, or dining choices-into actionable knowledge that enhances customer service and operational efficiency [Interviewee #7].
	"Even if I understand the importance to use technologies to share knowledge, I have to say that our morning meetings remain a useful tool for knowledge [sharing and] creation. They help us to fostering collaboration by discussing updates, insights, and best practices that enhance overall productivity and alignment within the organization [Interviewee #7].
Knowledge storing	"a robust property management system not only streamlines operations but also connects various functions within the hotel, ensuring that all departments work in harmony" [Interviewee #1].
	"The PMS enables active and continuous management of human tasks, allowing for quick and efficient organization of daily activities such as holiday requests, smart working permits, and shift planning. By integrating knowledge storage within the system, all relevant information-such as employee schedules, preferences, and past records-can be accessed and updated in real-time. This ensures seamless communication between departments, reducing manual errors and improving decision-making. The ability to store and retrieve knowledge allows managers to anticipate staffing needs, optimize workflows, and ensure smooth operations throughout the day" [Interviewee #5].
	"We collect a wide range of information about our customers-such as preferences, past behaviours, and special requests-it contributes to effective knowledge storage by creating a valuable database of insights. This stored knowledge allows the hotel to personalize services, anticipate guest needs, and tailor offerings to individual preferences. Over time, this information helps staff refine guest experiences, fostering loyalty and satisfaction and improve operational efficiency" [Interviewee #5].
	"Management systems like iPratico, Sysdat, and time stamping systems play a crucial role in knowledge storage. With these systems, I can efficiently capture, organize, and retrieve information. These systems help me to create a comprehensive knowledge repository that can be quickly accessed" Interviewee #7].
	"Technology is vital for preserving the historicity of knowledge, ensuring knowledge legacy, and reinforcing corporate identity through effective knowledge storage. By creating robust systems for documenting processes, decisions, and lessons learned, technology mitigates the risk of losing valuable insights during employee turnover, allowing organizations to maintain a historical record that benefits current and future team members" [Interviewee #7].
	"Even if I understand the importance to use technologies to share knowledge, I have to say that our morning meetings remain a useful tool for knowledge sharing [and creation]. They help us to fostering collaboration by discussing updates, insights, and best practices that enhance overall productivity and alignment within the organization [Interviewee #7].
	"We are implementing a management system for the maintenance department. We feel the need to equip ourselves with a dedicated software that for example can track the entire maintenance purchasing activities" [Interviewee #8].
	"We have a software that allows us to manage all the reviews we receive. In addition, we send an evaluation questionnaire to our guests via email. The activity is automatic through our PMS" [Interviewee #8].

Knowledge sharing	"A well-integrated PMS facilitates real-time communication between different departments. For instance, if a guest requests extra towels, the front desk can quickly notify housekeeping through the system, ensuring prompt fulfilment of the request" [Interviewee #1].
	"We organize regular strategy meetings focused on knowledge sharing. These meetings are not just about planning for the future; they also provide a platform for team members to exchange insights, expertise, and innovative ideas that drive both individual and organizational growth. In this activity, technologies are important to easily share information, but human-to-human interaction remains fundamental" [Interviewee #2].
	"We have an internal communication platform that helps staff communicate and manage tasks more efficiently without the need for phone calls or manual interventions. It improves workflow, speeds up issue resolution, and ensures better tracking of tasks across departments" [Interviewee #4].
	Enhance room cleaning efficiency with real-time updates sent instantly to staff mobile devices as guests check out and vacate rooms. This streamlines communication, allowing for greater flexibility in room management and significantly shorter response times for room service. Additionally, by facilitating knowledge sharing, staff can quickly identify and address necessary maintenance interventions, ensuring rooms are always clean, well-maintained, and in perfect condition. With instant access to shared information, teams can collaborate more effectively, anticipate guest needs, and ensure high service standards across all areas" [Interviewee #5].
Knowledge application	"One of the key tools in this approach is our PMS with several dashboards that provide real-time insights into various aspects of the hotel's performance, from occupancy rates to guest satisfaction metrics" [Interviewee #2].
	"The interaction between different hotel departments through technological support not only enhances communication but also drives knowledge application by using collected data to improve performance. For instance, in housekeeping, tracking data entered by employees-such as time spent on tasks, room cleaning status, and inventory usage-provides valuable insights. This knowledge allows our management to analyse performance trends, identify inefficiencies, and implement targeted interventions to improve efficiency. By applying this data-driven knowledge, we can optimize task allocation, reduce response times, and ensure consistent quality, ultimately enhancing overall operational performance across departments" [Interviewee #2].
	"I believe that by combining strong leadership, team building, and strategic delegation, organizations can harness the full potential of their collective knowledge, driving innovation, improving decision-making, and enhancing overall performance. Effective leaders build cohesive teams by fostering trust, collaboration, and open communication. In doing so, they create an environment where knowledge is shared and collectively applied to achieve common goals. This not only lightens the leader's workload but also ensures that knowledge is applied across different levels of the team" [Interviewee #6].
	"I think that a user-friendly system is essential for effective knowledge application, as it allows employees to easily access, understand, and use the information they need to perform their tasks efficiently. When systems are intuitive and simple to navigate, team members can quickly retrieve relevant data, apply their knowledge, and make informed decisions without struggling with complex interfaces" [Interviewee #7].
	"Recently, we have recruited a new employee with the role of Guest Experience Manager. His goal is to enhance overall customer satisfaction and loyalty through effective knowledge application. He is responsible for understanding guest preferences, gathering feedback, and analysing data to identify trends and areas for improvement. By leveraging this knowledge, hotel can tailor services and experiences to meet individual guest needs, ensuring that every interaction is personalized and memorable. Additionally, he collaborates with various departments-such as housekeeping, food and beverage, and front desk-to implement best practices based on accumulated insights. This proactive approach not only enhances service delivery but also creates a culture of continuous improvement, where knowledge is actively applied to elevate the guest experience and drive operational success" [Interviewee #8].
	"We have folders and subfolders on our management system. For example, if I need to publish a photo on a portal, I access the PR communication folder, take the photo and use it for my purpose. You can well understand how the process is very quick without me having to call and deal with others" [Interviewee #8].

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SIMA
Italian Society of MANAGEMENT

Sinergie Italian Journal of Management

Useful information for readers and authors

Aims and scope

What is the positioning of Sinergie Italian Journal of Management?

Sinergie Italian Journal of Management, the official journal of the Società Italiana di Management (SIMA-the Italian Society of Management), is a peer-reviewed scholarly publication that presents leading research across all business and management areas and focuses on the main trends and boundary-pushing ideas in management studies.

What is this journal's topic coverage?

The journal has a broad thematic profile and covers various areas in the business and management field, such as strategic management, corporate governance, entrepreneurship, international business, Sustainability, small and family business, operations and supply chains, strategic communication, marketing, retailing and service management, innovation and technology management, tourism and culture management and, of course, business ethics and general management.

What is "Italian" in Sinergie Italian Journal of Management?

This journal aims both to bring the Italian management perspective to the international debate and to encourage scholars worldwide to contribute through an innovative approach on topics relevant to the sound conduct of businesses and other organisations. The journal's keywords include, but are not limited to, management applications specially relevant to the Italian economy and other mature economies, such as manufacturing, creativity, *Sustainability,* open *Innovation,* digital transformation, entrepreneurship in small and medium-sized enterprises, family business, networks, alliances and territorial ecosystems, innovative value proposals and circular business models, as well as to the management of specific businesses, such as food, fashion, furniture, industrial equipment, art, culture, tourism, design and luxury.

How broad is the scope of this journal?

Sinergie Italian Journal of Management aims to balance relevance with methodological rigour and encourages interpretation, reasoning and critical, context-aware discussion about phenomena and their managerial implications. Narrow discussions focussed only on highly specific sub-fields will be regarded as non-priority.

Which research approach does this journal welcome?

The journal is open to different research approaches and welcomes both conceptual and empirical contributions that employ a qualitative, quantitative or mixed methods research approach. It also accepts case

studies, provided the analysis is adequate. Review articles that move beyond description to propose critical reflection and sound theoretical contributions are also welcome.

Issues frequency and coverage

When is the journal published during the year and are special issues part of the editorial planning?

The journal is published every quarter. It welcomes both the submission of manuscripts to be published in its regular issues and of manuscripts to be published in special issues edited by guest editors. Special thematic issues have always been a prominent feature of Sinergie Italian Journal of Management. Currently, the Editors are encouraging the development of special issues on relevant management themes that fit the journal's scope.

Principles and vision

What principles drive the conduct of this journal?

A few fundamental principles drive the conduct of Sinergie Italian Journal of Management:

- **Relevance**: The journal values the usefulness of research to improving management practice and to addressing business challenges and socially relevant issues.
- **Originality**: The journal encourages creativity, curiosity and interdisciplinary contamination in an effort to develop fresh, sometimes out-of-the-box, ways of conceptualising management-related phenomena.
- **Collaboration**: The journal fosters collaboration and networking with the different components of the national and international scientific community by considering their 'voices' and by being open to proposals of partnership with other journals.
- **Respect**: The journal promotes constructive, respectful dialogue among authors, staff and readers and recognises the dignity of individuals and the validity of their opinions.

What vision has inspired the development of this journal?

Connections between research, ethics, creative thinking and managerial action are the foundational premises on which to build a future based on the common good.

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How is journal content quality assured?

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Only original content is published, following evaluation procedures. The journal's editor-in-chief and co-editor are in charge of evaluating the papers and supervising the peer-review process.

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Editorials and explicitly invited contributions are not subjected to peer review.

The editors reserve the right to require changes to a manuscript, including to its length, as a condition of acceptance. The editors reserve the right, notwithstanding acceptance, not to publish the paper if for any reason such publication would, in the reasonable judgement of the editors, result in legal liability or violation of the journal's ethical practices. If the editors decide not to publish a paper, the author or authors are free to submit it to any other journal of any publisher.

The peer-review process can lead to:
- acceptance of the paper as it is
- acceptance with minor proposals for improvements
- acceptance subject to substantial modifications
- revise and resubmit
- rejection.

The review forms will be sent back to the corresponding author, who must return the paper within a specified time frame after revising it according to the reviewers' comments. In case of substantial modifications and of "revise and resubmit", the manuscript is sent again to reviewers for further evaluation.
Guidance by the editor-in-chief, guest editors and blind referees results in a 'training ground for young researchers', which at the time of foundation was declared as the mission of *Sinergie* by its founder, Giovanni Panati.

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2. relevance of the primary and secondary data sources and of the references
3. clarity of expression
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The paper should not exceed 10.000 words, including charts, figures, tables, footnotes and references.

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Book chapters

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